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USSR Report

CHEMISTRY

No. 96

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SUMMARY OF DATA ON FILTRATION OF INDUSTRIAL SUSPENSIONS THROUGH ARTICLE 56027 CAPRON FABRIC

Moscow KHIMICHESKOYE I NEFTIYANOYE MASHINOSTROYENIYE in Russian No 10, Oct 82 pp 20-22

MIROKHIN, A. M., candidate of technical sciences

[Abstract] Comparison of data from practically all known literature concerning filtration of industrial suspensions through capron fabric (article 56027) under different conditions of production and times of filtration was used to establish conditions of normal operation of continuous-action filter equipment. Mean rates of filtration of many different materials for times of completion of formation of the precipitate on the filter are presented in a table and discussed. The specific value of the mean rate of filtration is used as one of the boundary conditions of the filters. Figure 1; references 13 (Russian).
[49-2791]

UDC 543.24:543.31

COMPLEXOMETRIC DETERMINATION OF STRONTIUM AND CALCIUM IN CASES OF THEIR SIMULTANEOUS PRESENCE

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 4, No 5, Sep-Oct 82 (manuscript received 10 Aug 81) pp 460-461

CHISTOTINOVA, L. T. and GOLIKOVA, N. B., All Union Scientific Research Institute of Hydrogeology and Engineering Geology, Moscow

[Abstract] A rapid analytical method was developed for determination of simultaneously present strontium and calcium ions in liquid phase during leaching separation of their oxides. The method is based on different solubility of Ca^{2+} and Sr^{2+} sulfates in water. The method is optimal for Sr levels of more than 20 mg per test sample. Two aliquots are used for analysis.

In one the total amount of Ca and Sr is determined, in the second Sr is precipitated as a sulfate and without separation, Ca^{2+} ion is determined trilonometrically. Sr is then calculated from the difference. References: 4 (Russian).
[50-7813]

UDC 547.51+514

CLEANING PARAFFINS OBTAINED FROM PETROLEUM AND THEIR MICROBIOLOGICAL TRANSFORMATION

Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 106, No 1, Apr 82 (manuscript received 12 Jun 81) pp 73-76

SHAKARASHVILI, T. S., BEKAURI, N. G., DIDIDZE, A. V. and CHUBINIDZE, N. G., Georgian Polytechnical Institute imeni V. I. Lenin

[Abstract] The food protein deficit has been the impetus for experimental synthetic protein fodder production in development of protein yeasts or bacterial biomasses. Paraffins have been highly promising raw material for this purpose, and this article describes a study of the possibility of producing biomasses based on liquid alkanes from Georgian crude oil, using a process that eliminated the expensive stage of hydropurification and adsorption chromatography. The procedure using carbamide for removing paraffin complexes was first used in preparing diesel fuels, and allowed 40% cost reductions at the initial stage. The production of food yeasts based on Candida Guillermondy showed economic potential, since it would reduce the cost of food yeast supplements by 90 rubles per ton. References 8: 7 Russian, 1 English.
[9-12131]

UDC 547.821:542.941.7

HYDROGENATION OF PYRIDINE INTO PIPERIDINE WITH NICKEL-CHROMIUM CATALYST

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 8, Aug 82 (manuscript received 20 Jan 81) pp 1913-1915

SLAVINSKAYA, V. A., KREYLE, D. R., ZIYEMELIS, K. M., TOMSONS, U. A., GUTMANIS, A. Ye. and KREYTSBERGS, V. K., Institute of Organic Synthesis, LaSSR Academy of Sciences

[Abstract] The title hydrogenation was previously conducted using a nickel-rhenium catalyst under pressure, with 99% conversion of pyridine and 89% yield of piperidine. The authors tested the title hydrogenation at 140-192° C, hydrogen pressure of 20-65 atmospheres and pyridine feed of 15-60 ml/hour per 200 ml of catalyst. Results showed that temperature had little effect. Yields were 85-95% by molecular weight, with the best (95%) selectivity at 170°C. The selectivity using the nickel-chromium catalyst was judged to be much higher than that using the nickel-rhenium catalyst. Figure 1; references 3: 2 Russian, 1 English.
[5-12131]

UDC 66.023.001.57:66.096.5

DIRECTED CIRCULATION OF CATALYST IN REACTORS WITH PSEUDOLIQUIFIED LAYER

Moscow TEORETICHESKIYE OSNOVY KHIMICHESKOY TEKHNOLOGII in Russian Vol 16, No 5, Sep-Oct 82 (manuscript received 19 Jun 80) pp 702-706

KOMAROV, S. M., ROGOZINA, N. P., ABAYEV, G. N., TSAYLINGOL'D, A. L. and BASNER, M. Ye., Scientific Research Institute for Synthetic Rubber Monomers, Yaroslavl'

[Abstract] Difficulties with catalytic processes involving pseudoliquified layers are chiefly caused by the pneumatic transport system, which prevents attainment of the required circulation speed. The authors studied basic factors affecting this circulation in a model unit, which is diagrammed and

described, with air drive and diffuser monitoring. They showed that with the increase in the difference between linear speeds of the gas in various sections of the apparatus and constant size of the lower opening, and with the latter increased at steady linear speed, the catalyst circulation increases. In the test conditions it was determined that the limiting factor was the size of the lower opening. With directed circulation the catalyst concentration varied in sections of the apparatus from that in the stationary pseudoliquified layer. The authors also studied dynamics of circulation in a hot test apparatus with tracers. Both theoretical and experimental results confirmed the possibility of realizing highly effective control of internal circulation in such reactors. Figures 4; references 5 (Russian).
[20-12131]

UDC 539.215.4:546.718:541.128

DISPERSION OF TECHNETIUM IN APPLIED CATALYSTS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 9, Sep 82 (manuscript received 15 Dec 81) pp 1966-1970

PIROGOVA, G. N., PROKHORETS, N. M., MATVEYEV, V. V. and CHALYKH, A. Ye., Institute of Physical Chemistry, USSR Academy of Sciences, Moscow

[Abstract] Technetium serves as an effective catalyst in such processes as hydration and dehydration of hydrocarbons and alcohols, but little is known about the physical chemical properties of the surface of applied Tc catalysts. The authors studied one of those properties, dispersion, in two groups of Te catalysts, one with gamma-Al_2O_3 as the carrier and the other with Y_2O_3. After drying to metallic Tc, the product was analyzed using electron-microscope and diffraction methods. Relative surface and dispersion values were determined using chemosorption of H_2 and CO. Electron-microscope photographs showed an even distribution of Tc particles on carrier granules from 0.5 to 1.0 mcm. Diffraction confirmed the presence of metallic technetium and its porosity on various particles. The chemosorption method yielded satisfactory and comparable results as long as the Tc content exceed 1.0%. Figures 3; references 11: 5 Russian, 6 Western.
[21-12131]

UDC [66.097.13:661.183.6]"71"

GENERAL DIRECTIONS IN ZEOLITE CATALYSIS DEVELOPMENT

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 8, Aug 82 pp 461-468

MINACHEV, Kh. M. and ISAKOV, Ya. I.

[Abstract] Catalysts based on synthetic crystalline aluminosilicates, zeolites, are promising for a wide range of applications. Among the areas in which

zeolite catalysis is developing are azaolefin heteroaromatization, n-cumenylphenol cleavage, olefin epoxidation, ethylene glycol synthesis and butyraldehyde condensation. Zeolites have been used in the reaction of citronellal with isopropanol, the condensation of beta-hydroxy propylene diamine with carboxylic acids, synthetic methods using carbon monoxide, the conversion of methanol into olefins and the oxidative acetoxylation of propylene to allyl acetate. In inorganic chemistry zeolites are employed in reactions with carbon monoxide, nitrogen oxides, hydrogen sulfide and sulfur dioxide. Further developments are expected in pyrolysis, use of zeolites as adsorbents, improvement of current industrial applications, conversion of methanol to gasoline and the synthesis and study of new zeolite types, particularly those having high SiO_2 to Al_2O_3 ratios. The catalytic properties of multizeolite systems, new polyfunctional catalysts, use as matrices for transition metal complexes and components of heterogeneous metal-complex catalysts are receiving attention. Regulation of the properties of zeolite catalytic systems currently involves various additives. Polyfunctional catalysts are particularly important in hydrocarbon chemistry and in the simultaneous condensation and hydrogenation of butyraldehyde. Studies are in progress on the structure of zeolites and the mechanisms of their catalysis. Production and purification of new zeolites, particularly large-pore, further structural investigations, studies on the role of diffusion, development of accurate analytical methods for zeolites of high silicate content and development of the technological aspects of zeolite use are needed in the future. References 78: 29 Russian, 49 Western.
[340-12126]

UDC 541.140:621.78.066

CHEMICAL STABILITY OF SMELTED REFRACTORY MATERIALS TOWARDS $K_2S_2O_7$-V_2O_5 MELTS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 9, Sep 82 (manuscript received 20 Jan 81) pp 1951-1955

ABANIN, V. I., FEDOROV, A. A., MALYAVIN, A. G. and KETOV, A. N., Perm Polytechnic Institute; Institue of Continuum Mechanics, UNTs [Urals Science Center?], USSR Academy of Sciences; and Institute for Castings Problems of the UkSSR Academy of Sciences

[Abstract] Nine different materials, composed of varying percentages of SiO_2, Al_2O_3, CaO, MgO, ZrO_2, ZnO and Co_2O_3, were evaluated in the title study in order to develop new materials for use in smelting furnaces. Relative stability is judged on two factors: corrosion depth of the refractory in contact with the melt for 50 hours at temperatures between 500°C and 600°C and the changes in the surface phases of the refractory as determined by X-ray analysis. The composition 55% SiO_2+15% CaO+25% MgO is most resistant to corrosion. The least resistant material, having the composition 60% Co_2O_3+30% ZnO, corrodes about 200 times as fast. Alteration rims on the

contact surfaces often result in a barrier shielding the interior portion of the refractive material from further reaction. Figure 1; references 3 (Russian).
[29-12027]

UDC 547.594

SELECTION OF NEW CATALYSTS FOR SINGLE-STAGE HYDROGENATION OF PHENOL INTO CYCLOHEXANONE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 9, Sep 82 (manuscript received 27 Oct 80) pp 2050-2054

ARESHIDZE, Kh. I., CHIVADZE, G. O. and TSERETELI, B. S., Institute of Physical and Organic Chemistry imeni P. G. Melikishvili, GSSR Academy of Sciences

[Abstract] The title study was conducted using Ni and Ni+Cu catalysts on a substrate of bleaching clay (gumbrin) at temperatures between 100 and 250°C. The catalysts were prepared from Cu and Ni nitrate salts. After the reduction of the catalyst at 200°C in H_2, the Ni in the catalyst without Cu remained in the oxidized state NiO. In the Ni+Cu catalysts, the Ni is reduced to the metallic state. From this and other data, it appears that some type of Ni-Cu bonding occurs. Several Pd catalysts were prepared for comparison. Analysis of the products after the hydrogenation runs shows that the most selective catalysts are 0.48%Pd on clinoptilolite and 2%Ni+6% Cu on gumbrin modified with 3% caustic soda. The latter catalyst yielded 18.4% conversion. Other Pd catalysts and 6% Ni+2% Cu on gumbrin are much less selective forming cyclohexanol in amounts either only slightly less than or actually slightly greater than those of the desired product cyclohexanone. Figure 1; tables 3; references 9 (Russian).
[29-12027]

EXHIBIT STRESSES INNOVATIONS IN SOVIET CHEMISTRY

Moscow KOMSOMOL'SKAYA PRAVDA in Russian 9 Sep 82 p 4

[Article by USSR Minister of Chemical Industry V. V. Listov: "The Formula of Success"]

[Text] Chemical industry occupies one of the leading places in the national economy of our country. In many directions, Soviet chemistry has made the greatest advances in the world, and in terms of total production volume it now occupies first place in Europe and second place in the world.

In the last few years we have created fundamentally new processes for making chemical products using membrane technology, wasteless production and continuous plastic production processes.

The possibility of regulating molecular structure during formation of filaments and films out of synthetic polymers was a significant achievement in chemical fiber industry. In plastic production, a fundamentally new method has been developed for introducing mineral fillers into articles made from plastics and synthetic resins.

Developing swiftly, chemical science, technology and production are influencing the country's economy, effecting the introduction of chemical materials into the leading sectors of the national economy. Owing to mass use of polymers, a high level of development has been achieved in Soviet electronic and computer technology and in radio and television apparatus.

In motor vehicle building, for example, consumption of polymers has increased by a factor of 8-9. Four-fifths of the trim used inside passenger cars, buses, airplanes, vessels and passenger rail cars consists of molded polyurethanes, ornamental plastics and synthetic films, fabrics and leather. Use of plastics in construction has increased by almost 20 times in the last 20 years.

Chemical industry is now creating new fibers possessing properties unknown to natural fibers. An effort is now being made to create heat-resistant, so-called carbon fibers, which can withstand a temperature of 2,000-2,500 ° for a long period of time in an inert medium. The most acute problem of the century--the fuel and energy problem--is also being solved. The shortage of petroleum continues to grow, but in parallel the demand for it as motor fuel and

hydrocarbon raw material is increasing. Methanol industry will experience considerable development for the purposes of economizing on petroleum resources. We are intending to significantly increase production of methanol out of gas and coal, to add it to gasoline and to obtain gasoline and other products from it.

The high rate of development of chemical production and introduction of modern production processes and machine units with a high relative output capacity unavoidably raise the acute problem of environmental protection and make it necessary to reckon precisely with all of the consequences of chemical production's effect upon nature. An enormous effort is being made in our country to build and reconstruct structures and purify liquid wastes and exhausts.

A large part of the Soviet display at the exhibition is devoted to the things which chemistrygives to man. Achievements in agriculture, construction, medicine and consumer goods are displayed.

One can also find a new development of photographic industry among the displays of the exhibition--photographic materials for holography, a method by which a three-dimensional image is created on a plane. An abundance of other achievements of Soviet science and technology also pass in parade at this chemists' review.

There are many more examples of innovations that may be described as "first in world practice," "unique exhibits" and "having no analogues." And in fact, this exhibition differs from the previous "Chemistry" exhibition in the approach itself to its organization: The things selected for the displays were innovations in science, technology and production processes and things required for successful fulfillment of our national economic plans.

11004
CSO: 1841/47

25TH ANNIVERSARY OF ALL-UNION SCIENTIFIC RESEARCH INSTITUTE FOR SYNTHETIC RESINS-ACHIEVEMENTS AND PROSPECTS

Moscow PLASTICHESKIYE MASSY in Russian No 9, Sep 82 pp 3-6

KIYA-OGLU, N. V., director, All-Union Scientific Research Institute for Synthetic Resins

[Abstract] The author reviews accomplishment of the title institute (in its pilot plant) since its formation in 1958. Currently the institute's 50 laboratories and 8 shops are engaged in work on six primary problems of polymer chemistry. Polyurethanes including foams, thermoplastics, glues and synthetic leathers are one such direction for research. Technology for producing elastic and rigid polyurethane foam articles by pouring and spraying methods are developed in laboratories and an experimental production plant. The institute has studied synthesis of polyurethanes using hydroxyl-containing raw materials, including complex polyesters and simple polyesters based on alkylene oxide polymers. Another major area of research includes cellulose activization catalysis of cellulose esterification and hydrolysis of cellulose triesters. Cellulose from cotton residue and wood is being used to produce triacetate and diacetate fibers, as well as secondary acetate. Technical and mass consumption articles of cellulose esters are produced from etrol. Other research is concerned with thermoresistant polymers, development of "Terlon" production by periodic and continuous processes and computer automation of that production, phenol-formaldehyde oligomers and catalysis, production of equipment for micro- and macrospherical plastics, particularly PVCs, fluoroplastics, acrylonitriles and "Silar," and study of production processes and plant environments. The institute's discoveries have led to foreign licenses and significant production savings.
[11-12131]

UDC 66.057.36 2

STANDARD FOR UNIFIED CARTRIDGE FILTERS FOR LIQUIDS

Moscow KHIMICHESKOYE I NEFTIYANOYE MASHINOSTROYENIYE in Russian No 10, Oct 82 pp 31-32

KOCHKIN, G. M. and LEBEDA, N. S., engineers

[Abstract] The new All-Union Standard 26-01-120-80 provides for areas of filtration surface of the cartridge from 0,8 up to 160 m^2 according to the dimensions of the housing. It provides a standard for different types of filters based on 8 filter housings and provides for changing the type of filter by changing the tube plate. Parts in contact with the processes suspension can be made from cast iron, carbon steels, corrosion-resistant steel, titanium alloys or rubber-coated metal. The new standard placed in operation 1 Jan 1982, has an annual economic effect of 140,000 rubles. [49-2791]

UDC 614.841.12

PRINCIPLES OF COMBUSTION OF LOWER LIMIT MIXTURES OF ORGANIC COMPOUNDS WITH AIR

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 8, Aug 82 (manuscript received 26 Sep 80) pp 1910-1912

SHEBEKO, Yu. N., IVANOV, A. V. and KRUGLYAKOVA, N. M.

[Abstract] The lower concentration limit for flame spread is an important feature of a burning substance from the point of view of fire and explosion safety, and the approximate adiabatic combustion temperature is one of the chief measurements. While most organic substances go through the stages of conversion to CO and H_2O followed by further oxidation to CO_2, the second stage is regarded to be the variable. The authors studied the first stage, and were able to increase the accuracy of calculating the lower flame spread limit to some degree. A connection was established between the presence of inhibiting properties in a molecule and the lower limit of conversion to CO. References 12: 11 Russian, 1 English.
[5-12131]

UDC 536.46

SHIFT FROM BURNING TO DETONATION OF SOLID EXPLOSIVES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 266, No 3, Sep 82 (manuscript received 10 Dec 81) pp 652-655

DUBOVITSKIY, F. I., corresponding member, USSR Academy of Sciences, BAKHMAN, N. N. and FILONENKO, A. K., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] The burning of explosive substances under high pressure has been studied either with high charge density, where pressure increases with continued burning, or at low charge density, where pressure remains essentially constant. The authors studied poured and pressed hexogen and bis(methyl-dinitroethyl)nitroamine in a compressed nitrogen medium at $\leq$ 800 atm, and photographed rate of burning and rate of explosion. For this explosive, slow

layer burning and rapid convective burning were observed; statistical data on both are presented. The shift from burning to detonation was seen as a leap from a burning front to a vertical explosion line. A flash front and a shock wave were recorded by photoregister. The features of the explosion are attributed to the penetration of products of combustion into pores in the explosive, rapid development of "burning points," and possible initiation of weak detonations as microexplosions at the "burning points." The upper pressure limit is related chiefly to a worsening of conditions for the weak detonations after certain levels of pressure are attained. Figure 1; references 8: 6 Russian, 2 Western.
[12-12131]

UDC 541.126:541.128:541.428

POSSIBLE CHEMICAL MECHANISM OF INHIBITING NATURAL GAS COMBUSTION WITH CARBON DIOXIDE

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 56, No 9, Sep 82
(manuscript received 27 May 81) pp 2311-2312

NASYBULLIN, Sh. A., ZARIPOV, I. N., DYUL'DEVA, A. V. and FAYZULLIN, I. N.

[Abstract] Inert gases are known to inhibit combustion rate and the combustion zone of fuels by dissipating heat and reducing the concentration of the fuel, the oxidizer and active radicals. Best inhibition comes with CO_2, but it is not a completely inert gas. The authors studied the chemical mechanism by the qualitative and quantitative composition in a 22mm flame of a bunsen burner. The bunsen gas was composed of 67% methane, 16% ethane and 13% nitrogen. Results showed that addition of CO_2 slowed thermal cracking of CH_4 and reduced quantities of intermediate CO and H_2 and final H_2O products of combustion. The CO_2 did not react with any of these compounds. The result of the recombination reaction of the carboxylate radical is the formation of formic acid and its esters methyl- and ethylformate. The data indirectly show the possibility of inhibiting natural gas combustion with carbon dioxide through the mechanism of hydrogen atom acceptance. Figure 1; references 6 (Russian).
[22-12131]

'SINTEZKAUCHUK' BEGINS PRODUCING BUTYL RUBBER FOR TIRES

Moscow TRUD in Russian 20 Aug 82 p 1

[Text] Togliatti--The first batch of butyl rubber was made yesterday by the "Sintezkauchuk" Production Association. It is the raw material used to produce gastight rubbers. Drivers are well aware of a certain shortcoming of motor vehicles tire inner tubes. After a while, pressure begins to fall even in a new fully pressurized tire. The reason for this is that air escapes through the walls of the inner tube as a result of diffusion. Rubber made on the basis of butyl rubber does not have this property. This is why the association's products will enjoy broad application in the production of inner tubes for high capacity motor vehicles and cross-country vehicles.

11004
CSO: 1841/48

BRIEFS

CHEMICAL PLANT RECONSTRUCTION--Turkmen SSR--The Chardzhou Chemical Plant imeni V. I. Lenin is undergoing fundamental reconstruction without halting production. High-capacity complexes producing sulfuric acid and complete phosphorus fertilizers were placed into operation in the last few years. Production of mineral fertilizers is to be almost tripled in the Turkmen SSR in the 11th Five-Year Plan. [Text] [MoscowEKONOMICHESKAYA GAZETA in Russian No 38, Sep 82 p 2] 11004

CARBAMIDE IN SIBERIA--Kemerovo "Azot" Association has placed Siberia's largest granulated carbamide production complex into operation. The output capacity of the complex is 450,000 tons of mineral fertilizers per year. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 38, Sep 82 p 3] 11004

CONSTRUCTION OF AMMONIA COMPLEX--Grodno--Construction of a fourth ammonia production complex has begun in the Grodno "Azot" Association imeni S. O. Pritytskiy. The output capacity of the complex is 450,000 tons per year. It will go into operation in 1984, and a year later a high capacity carbamide production operation will be placed into operation as well. By the end of the five-year plan the "Azot" association will become one of the country's largest enterprises producing mineral fertilizers. After the output capacities of the new production operations are assimilated, each year chemists will be able to supply 600,000 tons of "fertility vitamins" to the countryside. [by N. Kernoga] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 23 Oct 82 p 2] 11004

CSO: 1841/48

UDC 541.123.31

SOLUBILITY OF UREA-POTASSIUM PYROPHOSPHATE-WATER SYSTEM

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 8, Aug 82 (manuscript received 13 May 80) pp 1742-1746

BABENKO, A. M. and ANDRIANOV, A. M., Physicochemical Institute, UkSSR Academy of Sciences

[Abstract] The title system was studied as an example of a basis for complex liquid fertilizers. Solubility of its components was tested by a polythermal method in the temperature range of -30 to +40° C to find NPK fertilizers with maximum nutritive value at low crystallization temperatures and to clarify the nature of the compounds formed. A two-component system $K_4P_2O_7$-H_2O was compared. Procedures are summarized in the experimental section. Results indicated that the components of the system did not form chemical compounds. Solubility isotherms showed the possibility of producing concentrated liquid fertilizers at from -30 to +10° C with from 17.7 to 42.9% nutritive substance $N+P_2O_5+K_2O$. Figures 4; references 9: 5 Russian, 4 Western.
[5-12131]

UDC [622.364(574):622.7].002.237

PROBLEMS OF COMPREHENSIVE UTILIZATION OF KARATAU PHOSPHATE ORE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 9, Sep 82 pp 535-539

MUKHTAROV, M. A., URGALIYEV, Sh. Sh., TYUTEBAYEV, S. T. and KOLIYEV, B. V.

[Abstract] The authors discuss the importance of the Karatau basin phosphorite deposits and planned utilization, which is to provide more than 30% of Soviet needs for phosphorus fertilizers. In the 1960s and 1970s an electrochemical process was used irrationally, to produce elementary phosphorus and sulfuric acid from the Karatau ore. Research at various institutes of the Ministry of Chemical Production and elsewhere has led to production of ammophos from the pulverized ore that typifies the Karatau deposits, but problems still remain for using the shale-type ores of the basin and much ore has been used

inefficiently. Research to correct problems related to the shale ores has concentrated on increasing P_2O_5 content and reducing clay-phosphate-silicon shale content in fertilizers. Meanwhile quartzite ores are being given preference. The plants of the area also must institute fundamental changes in ore preparation procedures, in order to improve the quality of the phosphates used as raw material.
[19-12131]

UDC 661.635.68-965.1

STUDY OF PROCESS FOR OBTAINING GRANULATED AMMONIUM POLYPHOSPHATE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 9, Sep 82 pp 539-541

ZHDANOV, Yu. F., GAVRILOV, N. B., MOROZOVA, A. T., UTOCHKINA, N. S., REVZINA, N. Ya., PACHINA, A. F. and ZUBAKOV, V. M.

[Abstract] Various approaches are used in the USSR and abroad to produce solid ammonium polyphosphate(APP). The authors studied a granulation process using an ammoniating and granulating test system, which is diagrammed and described. The test installation had 270 kg/hour capacity. It combined extracted polyphosphoric acid and ammonia in a melt that was then hardened and granulated through mechanical and chemical processing, which is summarized. Heat variation from 45 to 57° C did not affect the resulting product, granulated APP with 57-59% P_2O_5 in various forms and 12-13% nitrogen. Figure 1.
[19-12131]

UDC 541.654.546.(71-74)'263+546.171.5

IMMERSION METHOD STUDY OF COMPOUNDS OF NICKEL, COBALT, IRON AND MANGANESE OXALATES WITH HYDRAZINE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 9, Sep 82 (manuscript received 19 Oct 81) pp 2216-2218

LOGINOV, V. N., SHAROV, V. A. and NIKONENKO, Ye. A., Ural Polytechnical Institute imeni S. M. Kirov

[Abstract] Previously (this journal, 1969 and 1973), X-ray phase and chemical analyses were used to show the formation of four new phases in the system NiC_2O_4-nN_2H_4-xH_2O (where n = 1, 2, 3, 4). In the present study, tests were made with oxalates of $MC_2O_4 \cdot H_2O$ where M=Mn, Fe, Co or Ni, and corresponding compounds with hydrazine to determine whether a progressive conversion occurs from one phase to another, whether that conversion ends with whole number values for n and whether solid solutions form when n > 3. Results showed

that, when in coordination, hydrazine forced out the initial oxalate, leaving the C_2O_4 group's spatial location unchanged. In a transition from mono- to dihydrazinates, the Co and Ni oxalates showed increased crystal symmetry, while for Mn the reverse was observed. Compounds with a whole number amount of $N_2H_4(n)$ (n = 1,2,3,4) are self-contained when $\underline{n} > 3.3$, the complexes are in a transitional stage with respect to hydrazine content. References 7 (Russian).
[4-12131]

UDC 547.298+542.957.2+547.288

HYDRAZIDES OF DISUBSTITUTED GLYCOLIC ACIDS

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 18, No 9, Sep 82 (manuscript received 31 Dec 81) pp 1839-1843

BERDINSKIY, I. S. and MASLIVETS, A. N., Perm State University

[Abstract] Previously only the hydrazide of benzylic acid has been known; other disubstituted glycolic acids are obtained only with difficulty and their hydrazides were unknown. The authors developed a procedure using diethyl-oxalate and hydrazinehydrate to produce the hydrazide of the ethyl ester of oxalic acid. This reacted with haloid aryl- and alkyl-magnesium to produce alpha-propylbenzylidine hydrazides of disubstituted glycolic acids. As such a compound was also obtained by reaction of the hydrazide of nezylic acid with butyrophenone, the structures of the 14 compounds obtained in variants of the tests were confirmed. These compounds are described. On heating with butyrophenone in alcohol the oxalates of hydrazides of dialkylglycolic acids formed the initial alpha-propylbenzylidine hydrazides. Structures and uniqueness were confirmed by infrared spectroscopy and thin layer chromatography. Chemical procedures are summarized in the experimental section.
References 4: 1 Russian, 3 Western.
[32-12131]

UDC 546.791.6+547.828

CHARACTERISTICS OF URANYL CHLORIDE-PYRIDINE REACTION

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 10, Oct 82
(manuscript received 27 Jul 81) pp 2606-2611

KOBETS, L. V. and KHOD'KO, N. N.

[Abstract] Study is reported of the products of reaction of anhydrous UO_2Cl_2 and hydrated $UO_2Cl_2 \cdot H_2O$ with pyridine. The reaction of $UO_2Cl_2 \cdot 3Py$ occurs only in the absence of water; formation of $UO_2Cl_2 \cdot 3Py$ occurs only in the absence of water or other oxygenated ligand. Reaction with $UO_2Cl_2 \cdot H_2O$ occurs with the loss of Cl resulting in a U:Cl:N ratio of 1:1.5:2.5. This product has the formula $[U_2O_5Cl_3 \cdot 4Py]PyH$ and has a luminescence spectrum quite different from that of $UO_2Cl_2 \cdot 3Py$. Experimental procedures and structural confirmations are presented. Figures 3; references 19: 11 Russian, 8 Western. [30-12027]

UDC 546.791.6

THERMAL DECOMPOSITION OF TRIS(AQUO)MALONATODIOXOURANIUM(VI)

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 10, Oct 82
(manuscript received 23 Nov 81) pp 2612-2618

VOLOD'KINA, L. V., DUBROVIN, A. V., DUNAYEVA, K. M. and SPITSYN, V. N.,
Moscow State University imeni M. V. Lomonosov

[Abstract] The title decomposition was performed by heating the compound under vacuum and analyzing the products using X-ray and infrared spectroscopy together with chemical and thermal analyses. The decomposition of the uranium dicarboxylate trihydrate proceeds through three stages corresponding to the following formulas: first, $UO_2[CH_2(COO)_2] \cdot H_2O$, then $UO_2[CH_2(COO)_2]$ and finally UO_2. Other products of the reaction include acetone, water, CO and CO_2. Analysis of the data suggests that the reaction mechanism is the elimination of a CO_2 molecule followed by an intramolecular rearrangement of the remaining organic fragment. The overall equation for the reaction is

$UO_2[CH_2(COO)_2]\cdot 3H_2O \rightarrow UO_2 + 0.13\ (CH_3)_2CO + 0.66\ CO + 3.61\ H_2O + 0.67\ C$. The decomposition of a similar compound $UO_2(CH_3COO)_2$ results in the formation of UO_2, CH_3COOH, C, and CO_2. Figures 2; references 18: 15 Russian, 3 Western.
[30-12027]

UDC 541.123.31

DIAMMONIUMPHOSPHATE-MONOETHANOLAMINE-WATER SYSTEM AT 25 and 50° C

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 9, Sep 82
(manuscript received 3 Sep 81) pp 2421-2425

ISABAYEV, Z., SAIBOVA, M. T., ASKAROVA, M. K. and ABDUVALIYEVA, M.,
Chemistry Institute, UzSSR Academy of Sciences

[Abstract] Ethanolamine solutions have been used with inorganic and organic acids as growth stimulators and ripening agents for fruits. Their reactions with fertilizers is of both theoretical and practical interest, and the authors used an isothermal method to study the title system for the first time. Tests showed that temperature changes did not cause changes in the composition of the crystallizing phases. Solubilities of the system at 25 and 50°C are depicted graphically. The derivatogram of diammoniumphosphate showed two endothermal effects at 155 and 180° C when further heating was administered, both accompanied by mass loss. X-ray phase analysis using filtered copper radiation showed that the compound $(NH_4)_2HPO_4 \cdot 2NH_2C_2H_4OH$ had a particular crystalline structure, with the most intensive reflexes at 5-25°. Figures 4; references 9: 7 Russian, 2 Western.
[4-12131]

UDC 541.64:547.458.81

NEW PHOSPHORUS-CONTAINING DERIVATIVES OF CELLULOSE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 9, Sep 82
(manuscript received 4 Apr 81) pp 1850-1854

KHARDIN, A. P., TUZHIKOV, O. I. and LEMASOV, A. I., Volgograd Polytechnical Institute

[Abstract] To advance knowledge concerning production of synthetic fibers and films based on soluble cellulose derivatives without hydrogen sulfide and organic solvents, the authors studied cellulose derivatives containing carboxyls in reactions with trihydroxymethylphosphine and oxides of alkylenes

and aldehydes. Mono-, di- and tricarboxylcellulose, carboxylmethylcellulose and alginic acid were tested. They made it possible to obtain quaternary phosphonium salts with beta- and alpha-hydroxyalkyl groups. Then these products were treated with ethylene oxide, glycidol, propylene oxide, glycidil-methacrylate, formaldehyde, acetaldehyde, propionic aldehyde, acrolein and benzaldehyde, and measurements made of their properties, conversion of carboxyl groups, solvency in water and inflammability. Hydrolytic resistance was highest for carboxymethylcellulose, followed in order by alginic acid, tri-, di- and monocarboxylcellulose. Apparently residual amounts of carboxyl groups affected resistance to the action of hot water. Phosphorylation took place under mild circumstances at 0-60° C with high conversion of carboxylic groups regardless of their quantity and position in elementary chains of cellulose derivatives. References 13: 10 Russian, 3 Western.
[6-12131]

UDC 541.138.2

REACTIVITY OF CATION RADICALS OF TRIALKYLPHOSPHITES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 266, No 2, Sep 82 (manuscript received 26 Apr 82) pp 402-405

NIKITIN, Ye. V., ROMAKHIN, A. S., PARAKIN, O. V., ROMANOV, G. V., KOSACHEV, I. P., KARGIN, Yu. M. and PUDOVIK, A. N., corresponding member, USSR Academy of Sciences; Kazan State University imeni V. I. Ul'yanov-Lenin; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] The title radicals, which form during oxidation of full esters of phosphorous acid, react in an electrophilic aromatic substitution to form corresponding arylphosphonates. Their reactivity has not previously been reported. The authors used the method of concurrent reactions to obtain values that characterize substrate selectivity and position selectivity of triethylphosphate and tri-n-butylphosphite in reactions with a number of alkylbenzenes, and also partial substitution rates into ortho-, meta- and para-positions. Analysis of the reactive mixtures was monitored by gas-liquid chromatography. Data indicate that partial substitution rate factors on the ortho-position of the phenyl ring decrease with increasing amounts of the alkyl substituent, while the latter's increase in the aromatic ring leads to increased substitution rates on the meta-position. The reaction was relatively insensitive to alkyl substituents of the phenyl ring, but toluene had the least reactivity. The high reactivity of electrochemically generated electrophilic particles was attributed to a high degree of uncompensated positive charge. Figure 1; references 4: 2 Russian, 2 Western.
[13-12131]

UDC 543.51:542.91:547.59:546.185'131

EXO-PHOSPHORYLATION OF METHYLENEDIHYDROBENZENE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 9, Sep 82 (manuscript received 24 May 82) pp 2182-2183

ROZENBERG, V. I., NIKANOROV, V. A., GINZBURG, B. I., GAVRILOVA, G. V. and REUTOV, O. A., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] A typical property of trienes of the exo-methylcyclohexadiene type is the ability to undergo skeletal regrouping under the effects of electrophile reagents such as protonic acids and metal salts, forming stable aromatic derivatives of the benzyl type. The authors discovered that in reaction with PCl_5, unsaturated compounds of this type undergo substitution of the exocyclic proton with preservation of the semiquinoid system of pi-bonds. They found that the reaction of two equivalents of freshly distilled PCl_5 with trienes in benzene produced high yields of dichloranhydrides of semiquinoid phosphonic acids. References 3: 2 Russian, 1 Western. [21-12131]

UDC 547.241:539.2:548.7

CRYSTALLINE AND MOLECULAR STRUCTURE OF 7-METHYL-12-ISOPROPYL-12-THIONO-7,12-DIHYDROBENZO- alpha-PHENOPHOSPHAZINE

Novosibirsk ZHURNAL STRUKTURNOY KHIMII in Russian Vol 23, No 4, Jul-Aug 82 (manuscript received 29 Apr 81) pp 161-163

IONOV, V. M., PASESHNICHENKO, K. A., RYBAKOV, V. B., ZASTENKER, I. B. and ASLANOV, L. A., Moscow State University imeni M. V. Lomonosov

[Abstract] During systematic study of the structure of organophosphorus compounds, an X-ray structural examination was made of the title compound. Coordinates of non-hydrogen atoms were determined by a direct method involving computer calculations. Position parameters for all atoms and heat anisotropic factors for phosphorus and sulfur, as well as isotropic factors for the remaining atoms, were also calculated. The title compound was found to differ from related compounds by the length of bonds and valency factors at the phosphorus atom in the ring, which were a function of increased negative charge of the substitutent. Figure 1; references 2 (Russian). [23-12131]

UDC 541.63+547.241+548.737

MOLECULAR AND CRYSTAL STRUCTURE OF $C_6H_5P(O)(CH_3)_2$ AND LINKING EFFECT IN PHOSPHINE OXIDES

Novosibirsk ZHURNAL STRUKTURNOY KHIMII in Russian Vol 23, No 4, Jul-Aug 82 (manuscript received 18 Jun 81) pp 168-170

TKACHEV, V. V., ATOVMYAN, L. O., GONCHAROVA, L. V., SHVETS, A. A. and OSIPOV, O. A., Department of the Institute of Chemical Physics, USSR Academy of Sciences

[Abstract] Linking energy in aromatic compounds is known to be maximum if the substituent is in the same plane as the aromatic ring. It was expected that the linking effect of the phosphoryl group and the aromatic ring in oxides of aromatic and alkylaromatic phosphines would increase in the order $(XC_6H_4)_3PO < (XC_6H_4)_2 \cdot P(O)CH_3 < XC_6H_4P(O)(CH_3)_2$. Recent studies, however, have shown the exact opposite. The authors sought to explain the mutual orientation of the phenyl ring to the oxygen atom and the methyl groups in $C_6H_5P(O)(CH_3)_2$ crystals obtained from a benzene-isooctane mixture at melt point of 115-116°C. The structure and basic distances between components are diagrammed and discussed; further research is underway to determine orientational angles in the phenyl ring. Figures 2; references 14: 11 Russian, 3 Western.
[23-12131]

UDC 547.221+547.284

REACTION OF TRIALKYLPHOSPHITES WITH alpha-FLUOROSULFONYLKETONES

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 18, No 9, Sep 82 (manuscript received 23 Mar 82) pp 1846-1849

YERMOLOV, A. F., YELEYEV, A. F., KUTEPOV, A. P. and SOKOL'SKIY, G. A.

[Abstract] The Perkow reaction of trialkylphosphites with alpha-chloro-, alpha-bromo- and alpha-iodoketones involves elimination of the alkyl halide and formation of the corresponding complex enol ester. Where the alpha-haloketones contain only a fluorine atom, fundamentally different products form, dialkylfluorophosphate and a corresponding simple enol ester, which takes the form of E- and Z-stereoisomers in 7:3 ratio. The postulation of an intermediate bipolar ion of the type $Y\overset{+}{P}\text{-}O\text{-}\overline{C}R_2$ is discussed. The method of synthesis is based on use of relatively available alpha-fluorosulfonylketones and is simple, with high yields. Chemical procedures are given in the experimental section. References 8: 2 Russian, 8 Western.
[32-12131]

UDC 547.26'118

REACTION OF alpha-PHOSPHORYLATED TRIALKYLPHOSPHITES WITH ETHERATE OF BORON TRIFLUORIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 9, Sep 82
(manuscript received 27 Nov 81) pp 1958-1961

KONOVALOVA, I. V., OFITSEROV, Ye. N., MIRONOV, V. F. and PUDOVIK, A. N.,
Kazan State University imeni V. I. Ul'yanov-Lenin

[Abstract] A variant of the Arbuzov reaction, the isomerization of phosphorous acid esters into alkylphosphonates under the action of Lewis acids is of interest as a method for obtaining new phosphoroorganic compounds and for studying reactivity of phosphorus-element systems, particularly where oxygen is the element. The authors studied correlations between donor-acceptor mixes and reaction temperatures with the title compounds. They anticipated that the phosphone-group would imitate groupings formed in the isomerization of trialkylphosphites affected by $BF_3 \cdot OEt_2$. Diethyl-alpha-(O,O-diethylphosphono)methylphosphite and $BF_3 \cdot OEt_2$ were studied in various molecular ratios. Donor-acceptor features, infrared, PMR and ^{31}P NMR spectra are discussed for three phosphites produced in the tests. Results showed that isomerization of alpha-phosphorylated phosphites under mild conditions took place only with two or more times the theoretical volume of the etherate. The Arbuzov regrouping of dimethyl-alpha-(O,O-dimethylphosphono)ethylphosphite in the presence of catalytic amounts of $BF_3 \cdot OEt_2$ had a stereospecific character and led to formation of biophosphonates. Figure 1; references 6: 5 Russian, 1 Western.
[31-12131]

UDC 547.26'118

REACTION OF N-(DIPHENYL- AND PHENYLALKOXYMETHYLENE)AMIDODIMETHYLPHOSPHITES WITH DIACETYL

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 9, Sep 82
(manuscript received 22 Sep 81) pp 1962-1965

KONOVALOVA, I. V., GAREYEV, R. D., CHERKINA, M. V., YARKOVA, E. G.,
BURNAYEVA, L. A. and PUDOVIK, A. N., Kazan State University
imeni V. I. Ul'yanov-Lenin

[Abstract] The authors had previously reported on reactions of related phosphites with monocarbonyl compounds (this journal, 1981 pp 471 and 1666). In the present study they showed that the title reaction takes place with the participation of a single carbonyl group, yielding a crystalline product with a 1:1 ratio of components. Subsequent ring formation results in a tricyclic product containing a diazadiphosphetidine ring. The structures obtained were confirmed by infrared, ^{1}H and ^{31}P NMR spectra, and the composition by element

analysis. In solution, the dimer ring partially dissociated to 5-acetyl-2,2-dimethoxy-5-methyl-4,4-diphenyl-1,3,2-oxazophosphol-2-ene, while when stored it converted into 5-acetyl-5-methyl-2-methoxy-2-oxo-4,4-diphenyl-1,3,2-oxazophospholane. The reaction of N-(phenylalkoxymethylene)amidodimethylphosphites with diacetyl led to formation of 4-alkoxy-5-acetyl-5-methyl-5-methoxy-2-oxo-4-phenyl-1,3,2-oxazophospholanes. Chemical procedures are given in the experimental section. References 6: 5 Russian, 1 Western.
[31-12131]

UDC 547.26'118

REACTION OF ISOCYANATES AND ISOTHIOCYANATES OF DIALKYLPHOSPHOROUS ACIDS WITH DICARBONYL COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 9, Sep 82
(manuscript received 22 Sep 81) pp 1965-1969

KONOVALOVA, I. V., BURNAYEVA, L. A., KASHTANOVA, N. M. and PUDOVIK, A. N., Kazan State University imeni V. I. Ul'yanov-Lenin

[Abstract] The authors had previously shown that the title isocyanates reacted with carbonyl compounds activated by electron-acceptor substituents with participation of the isocyanate group (this journal, 1978 p 1460 and elsewhere). In the present work they studied reactions of dialkylisocyanato- and isothiocyanatophosphites with alpha-diketones and p-quinones, the former represented by diacetyl and benzyl, the latter by p-benzoquinone, p-chloro- and p-bromanils. Vacuum distilling with diacetyl produced 4,5-dimethyl-2-methoxy-2-oxo-1,3,2-dioxaphosphol-4-ene and 2-acetyl-2,4-dimethyl-3,5-dioxo-3-methoxy-1,4,3-oxazaphospholane. With benzyl, dimethylisocyanatophosphite reacted to produce 5-benzoyl-2,2-dimethoxy-4-oxo-5-phenyl-1,3,2-oxazaphosphol-2-ene, which could be in equilibrium in the solution with its dimer. With a thio-component, both diacetyl and benzyl reacted in one direction to yield products with dioxaphospholene structures. Reactions with p-quinones produced substituted oxazaphosphaspyrocyclohexadienones. Procedures are summarized in the experimental section. References 9: 7 Russian, 2 Western.
[31-12131]

UDC 547.26'118

REACTION OF SUBSTITUTED METHYLENEAMIDODIALKYLPHOSPHITES WITH NITRILES OF alpha-KETOCARBOXYLIC ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 9, Sep 82
(manuscript received 22 Sep 81) pp 1969-1972

KONOVALOVA, I. V., CHERKINA, M. V., BURNAYEVA, L. A., GOL'DFARB, E. I. and PUDOVIK, A. N., Kazan State University imeni V. I. Ul'yanov-Lenin

[Abstract] Continuing previous research (this journal, 1981 p 1666 and 1982 p 207), the authors studied reactions of N-(diphenyl- and

phenylethoxymethylene)amidodialkylphosphites with nitriles of benzoyl-, toluyl- and p-chlorobenzoylformic and trimethylpyruvic acids. Results showed formation of cyclocompounds that were tricyclic systems with diazadiphosphetidine fragments. Features of structure and composition of the 13 compounds obtained were confirmed by infrared, ^{31}P and ^{1}H NMR and nuclear magnetic double resonance, and element analysis. The authors hypothesize that thse reactions pass through an intermediate stage in which oxazaphospholene is formed, and the inclusion of the P=N bond in a five-membered ring facilitates the transition of tetrahedric phosphorus into a pentacoordinated form. Dimers formed were stable in crystalline form, but quickly dissociated into monomers in solution. References 6: 3 Russian, 3 Western.
[31-12131]

UDC 547.26'118

REACTION OF N-(PHENYLALKOXYMETHYLENE)-AMIDODIMETHYLPHOSPHITES WITH ETHYLIDINACETYLACETONE, ETHYLIDENACETOACETIC ESTER AND BENZYLIDENACETYLACETONE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 9, Sep 82
(manuscript received 22 Sep 81) pp 1972-1974

KONOVALOVA, I. V., CHERKINA, M. V., BURNAYEVA, L. A. and PUDOVIK, A. N.,
Kazan State University imeni V. I. Ul'yanov-Lenin

[Abstract] The authors showed previously that the reaction of substituted methyleneamidophosphites with various carbonyl compounds depended on the structure of the latter and involved either both the phosphorus atom and the methylamido-group, or only the former (this journal, 1981, p 471 and 1666, 1982 p 207). Here, results are presented for reactions of N-phenylmethoxy- and phenylethoxymethylene)amidodimethylphosphites with alpha,beta-unsaturated carbonyl compounds, on the example of the title compounds in equimolar mixtures, in inert gas atmosphere with heating. Analogous to phosphites, the methylenamidophosphites formed substituted 1,2-oxaphosphol-4-enes that resisted moisture. In distillation there was partial dissociation. Spectral results of infrared, ^{31}P and ^{1}H NMR and PMR are summarized. References 10: 8 Russian, 2 Western.
[31-12131]

UDC 547.76

2-CHLORO-1,3,2-DIOXAPHOSPHOLENES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 9, Sep 82
(manuscript received 25 Nov 81) pp 1974-1979

KARLSTEDT, N. B., KUDRYAVTSEVA, T. N., PROSKURNINA, M. V. and
LUTSENKO, I. F., Moscow State University imeni M. V. Lomonosov

[Abstract] Until recently only isolated examples of five-membered phosphorus-containing rings were known. The authors developed a method for synthesizing 2-alkoxy-(2-dialkylamino)-1,3,2-dioxaphospholenes with tricoordinated phosphorus atoms, then synthesized corresponding 2-substituted 2-oxophospholenes with tetra-coordinated phosphorus. Reactions with chloranhydrides of carboxylic acids led to the title compound in exothermal reactions where the temperature was held to 30°C to avoid resin build-up. Effects of temperature and mix variations are discussed. Synthesis of simple 2-oxo-1,3,2-diaxaphospholenes is of special interest in connection with the notion of sharply increased electronegative rings and their existence in a tricoordinated form. To determine substitution of the chlorine atom on the alkenyloxy-group the reaction of the title compound with mercurized oxo-compounds was conducted; under mild conditions only alkenyloxophospholenes formed. PMR and ^{31}P NMR spectra data are summarized. Procedures are given in the experimental section. References 10: 7 Russian, 3 Western.
[31-12131]

UDC 547.341

CHLORINE-CONTAINING 1,3-ALKADIENE-2-PHOSPHONATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 9, Sep 82
(manuscript received 27 Jan 81) pp 1979-1990

YEFANOV, V. A., MINGALEVA, K. S., DOGADINA, A. V., IONIN, B. I. and
PETROV, A. A., Leningrad Technological Institute imeni Lensovet

[Abstract] The oxidative chlorophosphorylation reaction is a convenient single-stage method for synthesizing organophosphorus compounds, but certain inconsistencies have recently been reported. The authors present results of the reaction of phosphorus trichloride and oxygen with mono- and disubstituted propargylchlorides. The resulting E- and Z-isomers of dichlorophosphonates and phosphonates, as established by PMR spectroscopy, are discussed. The dichloroanhydrides were used to produce dimethyl esters of corresponding phosphonic acids. Halogen-containing linked dienes with phosphorus on the middle carbon atom of the 1,3-diene system formed as the only final products in the reaction of oxidative chlorophosphorylation with disubstituted acetylene chlorine-containing hydrocarbons. The structure and composition of dichloroanhydrides of 1,3-alkadiene-2-phosphonic acids were determined by infrared,

NMR and PMR spectroscopy and element analysis, and the phosphonate structure confirmed by the chemical shift of phosphorus in the compounds involved. With both mono- and disubstituted acetylene halides the final products were compounds with phosphonate structures. Steric effects of the voluminous substituents determined the formation of a mixture of E- and Z-iosmers. Chemical procedures are summarized in the experimental section. Figures 3; references 12: 9 Russian, 3 Western.
[31-12131]

UDC 541.241+661.718.1

PHOSPHORYLATION OF CHLOROMETHYLATED COPOLYMER OF STYRENE AND DIVINYLBENZENE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 9, Sep 82 (manuscript received 25 Nov 81) pp 1991-1994

FESHCHENKO, N. G., KHIMCHENKO, T. V., KOROL', O. I., MAZEPA, I. K., POLYAKOVA, O. P., ZHUKOVA, N. G. and MATYUSHA, A. G., Institute of Organic Chemistry, UkSSR Academy of Sciences

[Abstract] Continuing their own and related research (this journal, 1967 p 231, 1977 p 572 and 1978 p 578), the authors studied reactions of the title compound with sodiumdiethylphosphite, a methyl ester of ethyleneglycolphosphorous acid, elementary phosphorus in the presence of iodine and alkyl iodides, to develop methods for introducing phosphorus-containing groups into the polymer and thus producing sorbents with new properties. The results of variants of the reactions are summarized. The reaction with sodiumdiethylphosphite produced the Michaelis-Becker reaction, the methyl ester led to an Arbuzov reaction that opened the ring, red phosphorus with equivalent amounts of iodine (or phosphorus diiodide) formed a monoalkylated product and eventually a copolymer of dialkyl(vinylbenzyl)phosphinoxide and divinylbenzene, and beta-diethylaminoethanol led to a copolymer of diethyl-(beta-hydroxyethyl)vinylbenylammonium and divinylbenzene. Chemical procedures and results are given in the experimental section. References 9 (Russian).
[31-12131]

UDC 547.241+547.341

IODIDES OF TETRAORGANYLAMMONIUM- NEW REDUCING AGENTS OF PRODUCTS OF PHOSPHORYLATION OF ALKENES BY PHOSPHORUS PENTACHLORIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 9, Sep 82
(manuscript received 17 Dec 81) pp 1994-1997

ROZINOV, V. G., RYBKINA, V. V., KOLBINA, V. Ye., PENSIONEROVA, G. A. and DONSKIKH, V. I., Irkutsk State University imeni A. A. Zhdanov; Institute of Petroleum and Coal Chemistry Synthesis, Irkutsk State University

[Abstract] Continuing previous research, the authors took a more detailed look at the reduction of hexachlorphosphates of organyltrichlorophosphonium. They hypothesized that equimolar mixtures of the reagents would permit separation of organyltetrachlorophosphanes regardless of which ions reduced the quickest, but ^{31}P NMR showed organyldichlorophosphines in the mixture, apparently because the hexachlorophosphates pa tially reduced and the organyldichlorophosphites chlorinated too slowly to form phosphoranes. The products of alkene phosphorylation reduced through the action of iodides of tetraorganylammonium in the presence of benzene, but in heptane or diethyl ester the process was slow and yielded few chlorophosphines. A mixture of KI and the chloride of tetraorganylammonium reacted under harsh conditions with the basic compound, but more slowly than with iodides, with lesser yields and contamination by products of the iodine reaction at the double bond. Chemical procedures are given in the experimental section. References 5 (Russian).
[31-12131]

UDC 547.241

MASS-SPECTROMETRIC STUDY OF SUBSTITUTED PHOSPHINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 9, Sep 82
(manuscript received 25 Jan 82) pp 1998-2001

MIKAYA, A. I., TRUSOVA, Ye. A., BUTKOVA, O. L. and ZAIKIN, V. G., Institute of Petrochemical Synthesis imeni A. V. Topchiyev, USSR Academy of Sciences, Moscow

[Abstract] Little study has been made of dissociative ionization of asymmetrical phosphines containing substituents other than alkyl groups, or of diphosphines. The authors studied mass-spectra of the electronic shock of phosphines containing alkyl, alkenyl, halogen-, alkoxy- and aminogroups, and diphosphines whose molecules contained phosphorus atoms bound by polymethylene or acetylene chains. Specific features of dissociative ionization of the products derived are discussed. Results showed that vinyl-, chloro- and ethoxyalkylphosphines disintegrate under electron shock through various types of separation and disintegration of alkyl substituents. The molecular

ion of dichloroethoxyphosphine can lose a Cl atom and a C_2H_4 molecule. Basic disintegration of divinyl(diethylamino)phosphine results from simple splitting of the P-N bond. Diphosphines in which the P atoms are bound by polymethylene and acetylene bridges eliminate an alkyl substituent from the $M^{+\cdot}$ molecule, then eliminate the remaining alkyl groups as lakene molecules. References 8: 3 Russian, 5 Western.
[31-12131]

UDC 546.185

SOME PROPERTIES OF TRIAMIDOPHOSPHAZOHYDRIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 9, Sep 82
(manuscript received 30 Oct 81) pp 2001-2011

KOYDAN, G. N., MARCHENKO, A. P., KUDRYAVTSEV, A. A. and PINCHUK, A. M.,
Institute of Organic Chemistry, UkSSR Academy of Sciences

[Abstract] Previously (this journal, 1978 p 2789 and 1980 p 679) the authors described methods for obtaining the title hydrides. Although it was expected that their properties would be similar to those of triorganylphosphazohydrides, a number of fundamental differences appeared. They are strong bases that readily force triethylamine out of its hydrogen halide salts, and their aqueous solutions have a strong alkaline reaction. With the exception of hexamethyltriamidophosphazohydride, they do not hydrolyze in prolonged heating with aqueous alkalines or hydrochl ic acid. The exception is hydrolyzed by a 40% solution of an alkali w_th destruction of the nitrogen-phosphorus bond, and by concentrated hydrochloric acid to phosphoric acid. With carboxylic acids in an ester solution they form crystalline, high hygroscopic substances. In reaction with trimethylsilylisocyanate they produce phosphazosilanes and cyanate salts of phosphazohydrides; with alkyl halides they yield various tetraamidophosphonium halides that have received little study. Chemical procedures are summarized in the experimental section. References 16: 4 Russian, 12 Western.
[31-12131]

UDC 547.26'118

SYNTHESIS AND PROPERTIES OF PHOSPHORYLATED beta-CYANOPROPIONIC ALDEHYDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 9, Sep 82
(manuscript received 3 Mar 82) pp 2020-2023

KHASKIN, B. A., RYMAREVA, T. G. and DROZDOVA, O. N., All-Union Scientific Research Institute for Chemical Means of Plant Protection, Moscow

[Abstract] Continuing studies of reactions of hydrophosphoryl compounds with aldehydes and ketones, the authors investigated reactions of dialkylphosphites with a substance containing aldehyde- and cyano-groups at the same time, as exemplified by the title compound. The reaction was conducted at 0-5°C in absolute chloroform with catalytic quantities of sodium methylate. Results showed that attachment occurred only to the aldehyde group, while the nitrile group was untouched. The compounds obtained, O,O-dialkyl-1-hydroxy-3-cyanophosphonates, were hygroscopic, easily melted crystals that decomposed at temperatures above their melting point. They reacted readily with electrophile reagents under mild conditions. At high temperatures in the presence of alkaline catalysts they decomposed. Chemical procedures are summarized in the experimental section. References 4 (Russian).
[31-12131]

UDC 547.221.415.3

REACTION OF HEXAFLUORO-2-(2-HYDROHEXAFLUORISOBUTYRIL)IMINOPROPANE WITH DIALKYLPHOSPHITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 9, Sep 82
(manuscript received 9 Mar 82) pp 2133-2134

KRYUKOV, L. N., KRYUKOVA, L. Yu. and KOLOMIYETS, A. F.

[Abstract] Usually, nucleophile attachment of dialkylphosphites at the short bond, including the azomethine bond, is achieved by heating in the presence of a basic catalyst. The authors showed that as a result of the isothermal reaction the title compounds reacted in exclusive P-alkylation of the ambident center to form acylamidophosphonates. The high reactivity was determined by the strong, symmetrical depletion of the pi-orbital of the highly polarized C=N bond. Chemical procedures are given. Reference 1 (English).
[31-12131]

UDC 547.241

REACTION OF ESTERS OF PHOSPHOROUS ACID WITH HYDRATES OF alpha,omega-DIHYDROPERFLUOROALDEHYDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 9, Sep 82
(manuscript received 30 Mar 82) p 2134

ALEYNIKOV, S. F., MASLENNIKOV, I. G. and LAVRENT'YEV, A. N., Leningrad Technological Institute imeni Lensovet

[Abstract] The authors discovered that, in heating at 30-90°C with a hydrate of 1,5-dihydroperfluoropentanal, tris(1,1,3-trihydroperfluoropropyl)phosphite formed bis(1,1,3-trihydroperfluoropropyl)1-hydroxy-1,5-dihydroperfluoroamyl-phosphonate. A phosphonate also formed in the reaction of the given aldehydohydrate with tris(2,2,2-trifluoroethyl)phosphite. Gas-liquid chromatography was used to monitor the reaction and determine purity of the products. Chemical procedures are summarized. Reference 1 (Russian).
[31-12131]

PROBLEMS, PROSPECTS OF MICROBIOLOGICAL PLANT PROTECTION TECHNOLOGY SUMMARIZED

Moscow KHIMIYA I ZHIZN' in Russian No 9, Sep 82 pp 6-7

[Article by N. Yefremov: "Instead of Insecticides"]

[Text] V. I. Orlovskiy, director of the All-Union Scientific Research Institute of Microbiological Plant Protection Resources and Bacterial Preparations, describes the creation, application and production of microbiological resources for protecting plants against insect pests to KHIMIYA I ZHIZN' correspondent N. Yefremov.

Nature itself is the main developer of microbiological preparations. As with all living organisms, insect pests have their own diseases and their own pests. What we do is gather insects that have died from natural causes, and then we isolate all microorganisms discovered in the victims and separate them by species. Then we try to determine which of them caused the insect's death. When, for example, we find bacteria capable of fighting these pests, we select the most active strains and reinforce this activity in their progeny.

This is followed by 2 or 3 years of testing: We determine how the bacterial culture affects useful field insects, birds which may feed on the insects and fish in water basins into which the bacteria may be flushed by a sudden rain. We dry out microorganisms that pass all the tests, and store them in sealed ampules. When a need arises for the preparation we open the ampules, allow the culture to reproduce, dry the culture, add an emulsifier (to promote better disolution of the preparation) and a sticker (glue keeps the bacteria from being washed away from a processed plot) and we granulate it: Now the preparation is ready.

The first way that microbiological preparations differ from chemical insecticides is that they act with strict specificity, having practically no influence upon surrounding nature. Moreover there are microorganisms which annihilate only one species of pests, though usually their spectrum of action is broader--up to several dozen and sometimes even hundreds of species of insect pests. For example the long-known preparation entobakterin kills 140-150 species.

The second unique feature of microbiological preparations is that they do not act instanteously. Things work more simply with chemicals: We dissolve them

and spray them, and when they settle on insects, they die. But our preparations need 3 to 5 days, and sometimes even more to infect the pests and exert their influence upon them. Once the following incident occurred during tests on a new substance. A few hours after we processed a field, the kolkhoz chairman came by and saw insects swarming about as if nothing had happened. With a disenchanted wave of his hand he condemmed the whole effort as nonsense and ordered the field to be sprayed with chemical insecticides. That seemed more dependable.

The third difference in bacterial preparations is that they have an aftereffect. Take as an example boverin and bitoksibatsillin, intended to control the Colorado beetle. If the larvae of the beetle are in their early stages of development, 95-98 percent of the insects will die after processing. But if the beetles reach a particular stage of development, the percentage of surviving insects will increase. But in the fall they disappear into the soil, which is infected by fungal spores, and in the spring the new generation of insects falls ill in its earliest instar, and it dies sooner. After 2 or 3 years of processing a reserve of the spores accumulates in the ground. If this reserve is constantly kept at a certain level, it would be much easier to deal with a sudden outbreak of the insects. Unfortunately, this is not always taken into account.

And in general, the effectiveness of microbiological plant protection resources depends in many ways on the quality of the agricultural production procedures employed. Many factors must be taken into account: the stage of development of the insects, the quantity of the pests, and the weather. The dosage must be determined precisely, and the optimum application procedure must be selected. And as you know, we have to remember the consequences. Of course, all of this makes the work more difficult. But agronomists are already morally prepared for this: A course on protecting plants from pests is now given in all of the country's agricultural institutions of higher education, and students are acquainted with both chemical and microbiological methods of insect control.

There is one other important factor of effectiveness--the equipment employed. Our preparations can be sprayed both from the ground and from the air. But conventional sprayers used for chemicals will not do; special sprayers producing fine droplets are needed.* Otherwise the effect would be weaker and expenditure of the preparation would be unjustifiably great, which significantly increases processing costs. Unfortunately we do not as yet have special equipment for microbiological preparations.

Now about production of the preparations. Microorganisms are capricious beings, they need strictly defined conditions. Producer strains of bacteria, for example, prefer to grow inside the substance of a nutrient solution. They are grown in fermenters--high-capacity airtight units. And some fungal

* Such spraying was discussed in an article by A. Izhin, "Half a Glass Per Hectare" in No 9, 1981--*editor*.

organisms can be obtained only by surface culturing methods (they propagate over the surface of the nutrient medium, and they do not want to grow inside it). The main indicator of equipment productivity becomes no longer the volume but just the area of the work zone. Therefore the units used to grow fungi are much more complex and expensive, and this influences the cost of the product.

There is one more problem, perhaps the most important. Microorganisms have their own pests--viruses and phages. As a rule producer strains of bacteria carry their own phages. When the production conditions are disturbed (and sometimes quite spontaneously) viruses begin to develop, killing the cells. Time is invested, and money is spent, and all for naught. This also raises the cost of our product considerably.

There are several ways of solving this problem. For example using the methods of genetic engineering. In principle we can obtain any microorganisms resistant to a phage. But viruses are a very plastic material; they adapt immediately to a new strain. We evoked directed mutations in bacteria, raising the resistance of microorganisms to several dozen viruses step by step. But on becoming invulnerable, the bacterial cultures lost a property that was most important to us--their activity, and they could no longer affect the insect pests. Nevertheless it would not be worth abandoning research in this direction: In principle, it still looks promising.

Another way is to find new phage-resistant species of bacteria exising in nature. Such strains must be out there. We have to learn how to find them and to fix properties of use to us in a whole culture.

But whatever the case, a clearly developed production process will always be a mandatory prerequisite of successful production of microorganisms. The equipment must be the most perfect, and it must be outfitted with instruments by which to monitor all parameters of the process.

Of course it is easier to come up with the suggestions than to embody them in metal. But we have very high hopes in the machine builders, all the more so because now is a time of transition from experimental production of bacterial preparations to industrial production. The assets allocated for this purpose must be utilized with maximum benefit.

11004
CSO: 1841/43

UDC 542.91:632.938

SYNTHESIS OF HYDRAZINO-symm-TRIAZINES CONTAINING AZIDO- AND CYANAMINO-GROUPS

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 35, No 7, Jul 82
(manuscript received 3 Jul 81) pp 474-478

DOVLATYAN, V. V., GOMKTSYAN, T. A. and KHACHATRYAN, N. Kh., Armenian Agricultural Institute, Yerevan

[Abstract] Given the high herbicidal activity of alpha-methylhydrazino-symm-triazines, the authors thought it promising to combine the title compounds and study their effects. Reaction of 2-alkylamino-4-chloro-6-azido(cyanamino)-symm-triazines with methylhydrazine sulfate revealed that in the presence of caustic soda 2-alkylamino-4-alpha-methyl-hydrazino-6-azido(cyanamino)-symm-triazines are obtained. These and related reactions are summarized in the experimental section. References 2 (Russian).
[18-12131]

UDC 628.162

WATER PURIFICATION FROM LINURON HERBICIDE WITH CHLORINE AND OZONE

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 4, No 5, Sep-Oct 82
(manuscript received 26 Sep 81) pp 468-469

RAK, L. V., TARAN, P. N. and SHEVCHENKO, M. A., Institute of Colloid Chemistry and Water Chemistry imeni A. V. Dumanskiy, UkSSR Academy of Sciences, Kiev

[Abstract] Linuron [N-(3,4-dichlorophenyl)-N'-methoxy-N'-methylurea] is a widely-used herbicide in agriculture. When linuron enters the water table, it is hydrolyzed to 3,4-dichloroaniline whose maximal permissible level (MPD) is 0.05 mg/l. MPD of linuron has not been established as yet. An attempt was made to develop a purification method based on oxidation of linuron with chlorine and ozone. It was shown that linuron could be removed from water only acid solutions and preferably at high concentrations of

chlorine (70-140 mg/l), whereby not only linuron but also its byproducts were affected. Ozone appeared to be an effective oxidizer in the pH range 7.0-12.0. In general, sewage could be treated either with chlorine or ozone; ozone was the preferred agent for purification of ground water. Figures 3; references 1 (Russian).
[50-7813]

SIMPLE CATALYTIC CONVERSION OF NATURAL GAS TO BENZENE ACHIEVED

Moscow KHIMIYA I ZHIZN' in Russian No 9, Sep 82 p 9

[Article by B. Inokhodtsev: "Six Moles of Methane, One Mole of Benzene"]

[Text] Since time immemorial, man has been using petroleum and coking by-products to produce aromatic hydrocarbons required in the production of polymers, dyes, medicines and many other things without which modern man cannot do. But situations are possible in the economy in which the most available form of organic raw material is not coal or petroleum but natural gas.

Man had known how to convert methane and ethane--the principal components of natural gas--into benzene before, but only through multistepped "textbook" synthesis which is ill-suited to industry. Now the Institute of Organic Chemistry of the USSR Academy of Sciences has developed a simple means of direct catalytic aromatization of the simplest unsaturated hydrocarbons (O. V. Bragin, T. V. Vasina, Ya. L Isakov, A. V. Preobrazhenskiy, N. V. Palishkina, Kh. M. Minachev, IZVESTIYA AN SSSR, SERIYA KHIMICHESKAYA, No 4, 1982, p 954).

At 300-600°C the synthetic zeolite known as TsVM (with silicon and aluminum oxides in a molar ratio of 33.3) catalyzes transformation of ethane into a mixture of aromatic hydrocarbons dominated by benzene and toluene. But if the zeolite is modified with 0.2-1 percent of a metal in group VIII, methane also enters into the reaction at 600°.

The yield of the target products is low for the moment: about 10 percent in the first case and 3.4 percent in the second. But with further experimentation, it will probably be increased. However, even if such an increase is not achieved, we must remember that if the process is sufficiently selective, we are often satisfied with even a modest yield in industrial production. After all, any initial compound which does not enter into the reaction can always be returned to the reactor. Methane, which is of the most interest to producers, does exhibit such hopeful selectivity: The authors report that practically the sole reaction product is benzene.

Not that long ago Soviet chemists developed a catalytic process making it possible to obtain one of the most valuable monomers from methane--propylene (see KHIMIYA I ZHIZN' No 11, 1981). Now it is benzene's turn.

11004
CSO: 1841/44

UDC 547.495.2:665.635

PRODUCING DEPARAFFINATED FRACTION FOR 'VMGZ' BASE OIL

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 9, Sep 82
pp 7-8

DROZDOVA, M. A., GUL'DIN, G. L. and YEDIGAROVA, V. S., Moscow Petroleum Processing Plant

[Abstract] The title oil is produced by carbamide deparaffination of suitable petroleum fractions in a 66-68% solution of isopropyl alcohol. When a mixture of West Siberian and Romashkinskaya crude oil is refined, VMGZ base oil of a desirable quality is obtained with initial boiling temperature of 265-280°C and 98%-boiling off temperature of 330-350°C. Use of Usinskaya crude oil with higher paraffin content has yielded a less-desirable base oil and this has required the present research to determine the specific features of that crude oil. It was found to contain more complex-forming compounds, and it has a higher congealing temperature and lower viscosity than analogous fractions of the other petroleums used. If a mixture of West Siberian, Romashkinskay and Usinskaya oils are used to obtain suitable base fractions for VMGZ oil the initial boiling point of the petroleum used must be higher than that of a mixture of only the first two crudes. Figures 2.
[8-12131]

UDC 665.637.6:665.637.37

EFFECT OF SOLVENT COMPOSITION ON DEEP DEPARAFFINATION OF REFINED PRODUCTS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 9, Sep 82
pp 8-10

GRYAZNOV, B. V., KRYLOV, V. B. and CHERNYAYEVA, T. V., All-Union Scientific Research Institute for Petroleum Production

[Abstract] Deep deparaffination is used to produce low- and medium-viscosity low congealing oils, but data indicate that the process can be used to produce

viscous oil with congealing temperatures of no more than -45° C. The authors studied deep deparaffination effects on refined products of various viscosities from West-Siberian petroleum. The process was conducted at -65° C in consideration of the possibility of an ethane block. Medium-viscosity, viscous and residual products were processed in ratios of raw material to solvent of 1:6, 1:6.5 and 1:7 respectively. With increasing methylethylketone mixed with toluene as the solvent, the filtration time decreased and oil yield went up. Also, the higher the viscosity, the narrower the range of ketone-content variations, thus enhancing oil yield. The success of this low-temperature deparaffination process offers promise for industrial output of the desired lubricants, but ketone content must be carefully controlled. Figures 2; references 4 (Russian).
[8-12131]

UDC 547.495.2:542.96:[547.21+547.313]

CARBAMIDE SEPARATING OF NORMAL ALPHA-OLEFINS FROM PETROLEUM PRODUCTS OF SECONDARY ORIGINS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 9, Sep 82 pp 12-15

KRUPINA, A. A., MATISHEV, V. A. and KOROLEV, A. B., Moscow Red Banner of Labor Institute of Petrochemical and Gas Production imeni Academician I. M. Gubkin

[Abstract] The need for various aliphatic alcohols, high-viscosity lubricants, biodegradable detergents and other products including alpha-olefins grows constantly; it is accompanied by increasing demands for purity. The authors studied effects of temperature and molecular mass relationships of alkenes and alkanes on the processes of their separation using carbamide. First the principles of temperature changes and their effects on the upper limit of complex formation was determined, followed by study of various petroleum fractions. Results showed that careful separation into alkenes and alkanes of acceptable (95-99%) purity is only theoretically possible. Actually, such separation must involve a summary concentration of n-alkenes-1 of no more than 10%, while products of paraffin cracking are in the range of 60% to 90%. Carbamide can be used to separate individual n-alkenes-1 from 20-25-degree fractions of secondary petroleum products under carefully controlled conditions. Figures 2; references 10: 8 Russian, 2 Western.
[8-12131]

UDC 66.022:621.311.2:665.63.634

EFFECT OF ADDITIVE COMPOSITION ON ANTIOXIDANT STABILITY OF T-6 FUEL

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 9, Sep 82 pp 17-18

LYKOV, O. P., VESELYANSKAYA, V. M., ENGLIN, B. A. and GUREVICH, Ye. A., Moscow Red Banner of Labor Institute of Petrochemical and Gas Production imeni Academician I. M. Gubkin

[Abstract] Phenol types of antioxidants have proved most effective for inhibiting oxidation processes during storage of jet fuels produced by hydrogenation methods. The present article describes study of antioxidants of amine and phenol types, viz., 2,6-di-tert-butyl-4-methylphenol[ionol],4-(N,N-dimehtylaminomethylene)-2,6-di-tert-butyl-4-methylphenol[Mannich-base of ionol] and aromatic amine, in total quantities amounting to 0.0015-0.003% by mass of the fuel. To determine effects of varying molar ratios, mixtures were varied from 10:1 to 1:2. The antioxidant effectiveness was determined on the basis of fuel oxidation at 140 and 150°C. Results showed all to be effective at the lower temperature, but at 150°C the aromatic amine and to a degree the first listed (ionol) retained their effectiveness, but the Mannich ionol base did not. Greatest effectiveness was obtained with a mixture of all three, which is explained by a synergistic function in which both types of additives break kinetic oxidation chains and thus reduce hydrogen peroxide yields. Another possible explanation is that the aromatic amine radical does not react with a phenol. Figures 2; references 6: 4 Russian, 2 English. [8-12131]

UDC 621.892.096/097

OILS FOR TWO-CYCLE CARBURETOR ENGINES

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 9, Sep 82 pp 18-19

MESHCHERIN, Ye. M., BORSHCHEVSKIY, S. B., OSTROVSKAYA, M. Ye. and SHABANOVA, Ye. K., All-Union Scientific Research Institute for Petroleum Production

[Abstract] Compact two-cycle engines in pumps, generators, chain saws and numerous other devices in the Soviet Union require effective oils that lubricate without fouling and that can be produced domestically. The authors studied a number of additives in "M-11" oil for antiwear and antiseize characteristics; none were found that improved the anticarbon properties of the basic oil. Therefore, a new additive called "TEF-3" was developed that did possess the desired anticarbon characteristic in combination with antiwear and antiseize properties. Only 2-3% of the special oil containing this additive is required in the mixture with gasoline. It was tested in chain saws, boat motors and motorcycles. References 4 (Western). [8-12131]

UDC 621.892.8

USE OF POWDERED METALS AS ANTIFRICTION ADDITIVES IN PLASTIC LUBRICANTS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 9, Sep 82
pp 29-21

SINITSYN, V. V. and VIKTOROVA, Yu. S.

[Abstract] Metal powders have long been used for lubricating bearings and joints. The authors compared the antiseize properties of powdered lead, tin, molybdenum disulfide and graphite in lithium grease used on vehicles and aircraft. Results showed the superiority of grease containing lead and tin to that without them, but even better results came with molybdenum disulfide. Graphite's effectiveness fell between that of lead and tin. The metal powders did not affect other parameters of the grease. Molybdenum disulfide has the further advantage of avoiding toxic nature of lead and sparing that scarce metal. Figures 2; references 14: 12 Russian, 2 Russian translations from English.
[8-12131]

UDC 665.765:404.038.2

EVALUATING PROTECTIVE PROPERTIES OF MOTOR OILS UNDER OPERATING CONDITIONS BY POLARIZATIONAL RESISTANCE METHOD

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 9, Sep 82
pp 31-33

CHUDINOVSKIKH, A. L., KOTLOV, Yu. G., GRIGOR'YEV, M. A., POLYAKOV, S. G., KUZNETSOV, V. A. and BUNAKOV, B. M., Central Red Banner of Labor Scientific Research Institute for Automobiles and Auto Engines; All-Union Scientific Research Institute of Petrochemistry PK [Planning and Design?]

[Abstract] To improve the quality of motor oils for domestic internal combustion engines, the "Auto Institute" has developed methods for visual inspection to determine corrosion, but this approach does not permit evaluation under operational conditions. The authors used the title method to study the effectiveness of measuring electrochemical corrosion, employing a complanar recorder with two electrodes. Its operation was tested on a ZIL-130 engine. A major factor in corrosion was found to be the temperature, since it determined the amount of condensation and formation of electrolytes on engine parts. The polarizational resistance method was judged effective for measuring protective properties of motor oils; the domestic M-4z/8$B_2$$G_1$-RK oil was found to be highly effective. Figures 3; references 4 (Russian).
[8-12131]

UDC 621.892.096.1.001.5

RAPID EVALUATION OF WEAR CAPACITY OF ALKALINE ADDITIVES TO MOTOR OILS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 9, Sep 82
pp 33-35

VIPPER, A. B. and LISOVSKAYA, M. A.

[Abstract] In recent years attempts have been made to extend the useful life of motor oils. One parameter of oil wear is the alkaline number, which can be measured on the basis of reactions of acid products of combustion with alkaline additives. The authors sought to simplify this type of evaluation further by eliminating the generator in which SO_2 vapors react with the product being tested. They tested DC-11 oil with additives of calcium sulfonate, high-ash calcium alkylsalicylate, highly alkaline calcium alkylphenolate and combination of these. Results showed that among sulfonates the most rapid wear came with magnesium; calcium-containing additives were more durable than those containing barium. Additives intended to achieve the same purpose showed wide variations of the alkaline number in actual tests, and they could be tested efficiently using the proposed simplified method. References 4: 2 Russian, 2 English.
[8-12131]

UDC 662:758

PHYSICOCHEMICAL AND OPERATIONAL PROPERTIES OF WATER-FUEL EMULSIONS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 9, Sep 82
pp 39-40

AZEV, V. S., LEBEDEV, S. R., GUSEV, A. A., ROBUSTOV, V. V. and LUNEVA, V. V.

[Abstract] As internal combustion engines, including diesels, have become perfected, methods for mixing water to extend fuel economy have been attempted. This innovation was also intended to improve cooling and combustion of the air-fuel mixture and reduce toxicity of exhaust gasses. The authors studied diesel fuels with 10-11.7% water and surfactant additives, treating them with ultrasound and testing by current load methods. Short-term tests showed promising results for operating diesel engines with the emulsion; metallic or metal-ceramic filters were required in place of hydrophil filter materials. References 7: 3 Russian, 4 Western.
[8-12131]

UDC 665.7.038.?

OPTIMAL CONDITIONS OF ACYLATING POLYAMINES FOR PRODUCING GASOLINE ADDITIVES

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 9, Sep 82
pp 40-41

NIKITINA, Ye. A., LERMAN, A. G., KORSAKOVA, I. S. and AKIMOV, S. V., All-Union Scientific Research Institute for Petroleum Production

[Abstract] Surface active substances such as N-derivatives of carboxylic acids contribute to detergent and wear-protection properties of motor oils. The authors studied salts and amides of polyamines and higher carboxylic acids, since their properties can be changed over a wide range, their initial components are readily available and their production is simple. Their acylation was tested in temperatures of 120 to 210° C and periods of 30 minutes to 6 hours. Detergent properties were measured on the basis of reduction of surface tension at the boundary between polar and non-polar phases (water and toluene), while electrochemical measurements determined protective characteristics. Results showed that increasing temperature and acylation time had a negative impact on protective properties. Beyond 140-150° C the same was true for detergent qualities. Increasing the ratio of components in the mixture in favor of acids improved protective properties. Figures 2; references 7: 5 Russian, 2 English.
[8-12131]

UDC 612.017.1

IMMUNOLOGY AND IMMUNOCHEMISTRY

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA in Russian Vol 27, No 4, Jul-Aug 82 pp 362-368

PETROV, R. V., director, Department of Immunology, Moscow Order of Lenin State Second Medical Institute and director of a section in the Institute of Biophysics, USSR Ministry of Health and BEREZIN, I. V., director, Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences and director, Department of Chemical Enzymology, Moscow State University imeni M. V. Lomonosov

[Abstract] By way of introduction to an issue devoted to contemporary problems in basic and applied immunochemistry, the general field of immunology is reviewed. The origin of the discipline and the concepts of genetic immunologic control, specificity of the immune response and phenotypic correction are discussed. Specific accomplishments in vaccine development, blood type determination, prevention of Rh disease, immune suppression of transplants and diagnostics are mentioned. Discoveries in antibody structure, cross reactivity and monoclonal antibodies and their applications to such areas as interferon purification are described. Subjects cited also include monovalent and polyvalent interactions, new methods of immunological analysis involving immobilization, markers, automation, radioimmunoassay, enzyme immunoassay and immunochemical analysis based on chemi- or bioluminescence or fluorescence. National economic problems which can be solved using immunology and immunochemistry include prevention of such diseases as influenza and gonorrhea, artificial control of the immune system for therapy of cancer, autoimmune disease and chronic infection, determining the mechanism of maternal-fetal immune interaction, compensation for external damage to the immune system and improved microanalysis and immune biotechnology. Solution of these problems depends on work in genetic control, lymphocyte molecular biology, immune mechanisms, antibody structure and biosynthesis, microbial and synthetic antigens, immunopharmacology, immune deficiency, allergy, aging, cancer immunology and mathematical models. References 8: 4 Russian, 4 Western.
[336-12126]

UDC 577.11

HOMOGENEOUS ENZYME IMMUNOASSAY--NEW DIRECTION IN IMMUNOCHEMISTRY

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA in Russian Vol 27, No 4, Jul-Aug 82 pp 450-457

GAVRILOVA, Ye. M., candidate in biological science, senior scientific staff member Department of Chemical Enzymology, Chemistry Faculty, Moscow State University imeni M. V. Lomonosov

[Abstract] Enzyme immunoassay (EIA) is based on the fact that more free hapten present in a reaction system will lead to less labeled hapten-substrate reacting with an antibody present, so that less change in enzyme activity will be recorded. Since free and labeled hapten do not need to be separated, the analysis can be accomplished in 2-20 minutes. Method mechanisms include substrate steric hindrance, antibody induced changes in enzyme active centers and antibody modulated effects of substrates and inhibitors. Antibody production and hapten-immunogen complex formation are important stages in method development. Homogeneous EIA permits antibody-antigen kinetics and equilibria to be studied directly. Scatchard plots are used to determine antibody population homogeneity. Enzyme-hapten conjugates are produced by means similar to hapten-immunogen complexes, particularly using mixed anhydrides. They must be tested for molar hapten-to-enzyme ratio, enzyme activity and immunological reactivity. EIA sensitivity is determined by sensitivity of the enzyme detection system, concentration range in which the enzyme activity is modulated by the antibody, antigen-antibody binding constants and presence of interferences in the sample. Among the current applications of EIA are therapeutic drug monitoring, diagnosis of acute drug or narcotic poisoning and quantitative determination of hormones. Figures 4; references 39: 2 Russian, 37 Western.
[336-12126]

UDC 616-07(0.88.8)

PROBLEMS IN CONTEMPORARY MEDICINE AND IMMUNOLOGY

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA in Russian Vol 27, No 4, Jul-Aug 82 pp 457-463

POKROVSKIY, V. I., academician, USSR Academy of Medical Sciences, director, Central Scientific Research Institute of Epidemiology, USSR Ministry of Health and SEMENOV, B. F., professor, doctor of medical sciences, director, Moscow Scientific Research Institute of Vaccines and Sera imeni I. I. Mechnikov

[Abstract] The health of the population is a very important economic factor, since illness represents lost work time and resource expenditure. At the present time, the most promising means for increasing health via serological diagnosis are radioimmunoassay (RIA) and enzyme immunoassay (EIA). The automation possibilities inherent in EIA make it useful for preventive medicine

and early diagnosis. EIA has application in epidemiology, therapeutic drug monitoring, production of vaccines and sera, standardization of biological preparations, detection of allergens and autoantibodies, control of environmental and food contamination and scientific research. In bacteriology, EIA has been employed since 1972, particularly for diagnosis, due to its great advantages in sensitivity, simplicity and comparatively low cost. Significant areas for its use include detection of cholera and plague introduced from outside the USSR and early diagnosis of leprosy, parasitic and viral diseases. EIA is widely used for difficult to detect or to culture infectious agents, such as hepatitis and cytomegalovirus. Tests are being developed for embryonic antigens which may lead to cancer-screening methods. EIA is currently employed outside the USSR for determination of hormone levels; this area is currently being studied in various Soviet scientific research institutions. Methods for determination of anticonvulsants, digoxin, theophylline, medocaine and hetamycin in serum have been developed by non-Soviet scientists. Introduction of EIA into the USSR would save several hundred million rubles, as a result of increased laboratory efficiency, fewer work days lost to sickness and less expensive analytical methodology.
References 24: 4 Russian, 20 Western.
[336- 2126]

UDC 619:616.34-085.37

IMMUNOCHEMICAL METHODS IN AGRICULTURE

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA in Russian Vol 27, No 4, Jul-Aug 82 pp 463-468

PROSTYAKOV, A. P., professor, doctor of biological sciences, head of the Biochemical Methods of Control and Standardization Laboratory, All-Union State Scientific Control Institute of Veterinary Preparations, USSR Ministry of Agriculture and BOBKOVA, A. F., candidate in biological sciences, scientific staff member of the Department of Virology, Biology Faculty, Moscow State University imeni M. V. Lomonosov

[Abstract] In plant cultivation science, immunochemical methods are used primarily for phytopathological diagnosis and immunogenetic analysis. Plant virus detection, on a large scale and under field conditions, should become possible with enzyme immunoassay (EIA), since this method is highly sensitive and uses small amounts of material. EIA has been used in beans, fruit and potatoes. Future requirements for EIA in plant agriculture include universal antisera and adaptation to serial field testing in agricultural laboratories, via centralization of reagent production, use of plant tissue rather than extracts and method simplification. EIA is also promising for veterinary medicine, in the diagnosis of such conditions as leucosis, anthrax and colisalmonellosis, and in safety analysis of meat and milk. Foot and mouth disease, animal viruses and parasites such as trichina are being studied for development of EIA tests. Widespread application of EIA should result

in protection of agricultural animals from infectious disease, improved quality of the food supply and better epizootic studies and monitoring of antibiotics and pesticides. In the breeding of improved agricultural animals, immunochemistry is needed to study disease resistance, hardiness, technological problems, blood groups and fertility. However, simpler and more economical methods for producing immunoactive proteins are required. References 52: 5 Russian, 47 Western.
[336-12126]

IMPROVEMENTS MADE IN POLYSTYRENE PRODUCTION PROCESS

Moscow PRAVDA in Russian 16 Sep 82 p 3

[Article by USSR Academy of Sciences Corresponding Member M. Koton: "The Universal Polymer: In Pursuit of the USSR State Prize"]

[Text] Chemistry has enriched mankind with new materials and compounds unknown to nature, and it has expanded and continues to expand the assortment of the most diverse articles. As an example it would be simply impossible to imagine either the national economy or our life itself without synthetic polymers. The assortment of synthetic high molecular compounds numbers in the thousands of names. But at the same time only a few polymers make up the greater proportion of the plastics and synthetic resins produced. They include the polystyrene plastics and, most important among them, shock-resistant polystyrene.

The sphere of its application is vast. This plastic is used to make body parts in radio engineering, as an inside lining in refrigerators, to produce disposable tableware, and to package food products. A superior dielectric and a renowned construction material, a water-resistant, beautiful and hygienic material, plastic is needed by practically all sectors of the national economy. On the other side of the coin, until recently the demand for plastic simply could not be satisfied because the production processes were capable of an output of only a few thousand tons of such plastic per year. Moreover the polymer was rather expensive, and it contained a so-called residual monomer--styrene. Just half of a percent in the plastic is enough to make it unusable as, for example, a food packaging material. This is precisely what has been hindering the use of polymer in sectors requiring highly pure material.

Because of growth in the demand for shock-resistant polystyrene, the need arose for finding acceptable production concepts and creating fundamentally new, high-capacity, low-energy, economical processes in the shortest time possible. This task was given to the Okhtinskiy "Plastpolimer" Scientific-Production Association.

The path of any development, and all the more so in chemistry, from the beginning of research to introduction of the results into large-scale practical use, is known to be long. This time however, in a way typical of many of the projects of "Plastpolimer," the Okhtinskiy chemists--planners, process

engineers and designers--solved the problem rather quickly in cooperation with specialists from Moscow and the Ukraine and with machine builders. If we make a comparison with similar processes, the time it took to arrive at an industrially feasible process was decreased by 3-4 years. Such rapid creation and introduction of a new production process was promoted primarily by non-traditional principles of work organization. Many of the stages of the work were conducted in parallel, and the high quality of the research made it possible to go from a small experimental facility immediately to manufacture and installation of high-capacity equipment.

I would like to make special mention of the originality of the production process itself. The developers selected a system for polymerizing styrene in bulk, in a cascade of reactors. This method turned out to be better than all of the known ones, inasmuch as it insures continuity of the process, it permits its automation, it sharply increases labor productivity, and it reduces consumption of energy and metal. These advantages are the product of the fact that the polymer is obtained in the final stage not as a suspension but as a melt. Consequently the laborious operations associated with processing a suspension are eliminated.

Even the most progressive production companies use a solvent when polymerizing styrene in bulk. This reduces the load on the equipment somewhat and promotes a smoother-running synthetic process, but it means an increase in reactor volume and requires creation of a complex solvent regenerating unit. The scientists decided to do away with the solvent altogether, proposing instead the manufacture of new equipment having no analogues.

Without going into details that would require the expertise of a chemical specialist, let me note that the developer collided with numerous technical problems. Take as an example diversion of excess heat generated in the polymerization process. Known production processes are not encumbered by this need, but they do require greater energy outlays associated with a profusion of contaminated wastes, and they consume a larger quantity of auxiliary raw material. A comparison of the "pluses" and "minuses" directed the creative thought of the researchers into a new channel: They developed a process in which monomer is polymerized in a boiling state, and thus they solved the problem of removing the excess heat of the reaction.

There was another problem that also turned out to be quite difficult: How is residual toxic monomer to be kept out of the product? Here again an optimum variant was found.

There are many such facts. The development of the Okhtinskiy chemists is protected by 17 author's certificates for inventions, and it has been patented in a number of countries. In our country more than a dozen high-capacity lines are now operating on the basis of the new production process. Production of shock-resistant polystyrene increased sixfold. The productivity of the new lines is two to three times greater than that of similar production operations in the country. The relative capital investments are 20 percent less. The product is also significantly cheaper. Just last year the economic impact enjoyed by consumers was about 150 million rubles.

It is entirely clear from the point of view of the future that the proposed process and the production lines will be able to serve as a basis for expanding the assortment of products and for obtaining materials with a prescribed complex of properties. And the experience that has been acquired and the principles of organizing the research and solving a major technical problem may be utilized successfully when planning processes for synthesis of other polymers by an analogous method, one which would significantly surpass other methods in terms of its economic and ecological indicators. Development of this highly productive process and the equipment used to produce shock-resistant polystyrene by the new method, and introduction of this development on an industrial scale have rightfully been proposed as candidates for the USSR State Prize.

11004
CSO: 1841/46

UDC 541.64:539(19+3)

RELAXATIONAL PHI-TRANSFER IN FILLED POLYMERS AND MOLECULAR MOBILITY OF ACTIVE FILLER PARTICLES

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 9, Sep 82 (manuscript received 18 Mar 81) pp 1836-1841

BARTENEV, G. M., Institute of Physical Chemistry, USSR Academy of Sciences

[Abstract] Filled polymers contain a complex structure that leads to various relaxational features, including low-temperature alpha-transfer and high-temperature phi-transfer above glass point. The author proposes a theory to explain the latter on the basis of molecular mobility of active filler particles in the polymer matrix, subsystems that form the grid, and heat transfer wherein chains are separated from active centers and assume new positions, accompanied by relaxation of tension. In contrast to unconcentrated colloidal systems with low viscosity, filled elastomers contain particles in a viscous matrix that undergo heat oscillations at specific rates and intervals. The author relates his theory to experimental data from two elastomers filled with technical carbon, among the most active fillers. Filled butadiene-styrene and isoprene particles can be measured with an electron microscope. Relaxational spectrometry confirmed results. Figures 4; references 16 (Russian).
[6-12131]

UDC 541.64:532(893+135)

ENERGIES AND VOLUMES OF ACTIVATION OF PLASTIC FLOW OF SEVERAL POLYMERS UNDER HIGH PRESSURE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 9, Sep 82 (manuscript received 20 May 81) pp 1889-1893

ZHORIN, V. A., USICHENKO, V. M., BUDNITSKIY, Yu. M., AKUTIN, M. S. and YENIKOLOPYAN, N. S., Institute of Chemical Physics, USSR Academy of Sciences

[Abstract] Plastic flow of polymers initiated by shift deformation under high pressure has received considerable attention, but no data have been obtained

on the title parameters. To remedy this the authors studied low pressure polyethylene, polypropylene, polyvinylcyclohexane, PMMA and polyacrylamide, as well as other low pressure substances, at temperatures of 20-210° C and pressures of 300-800 MPa. Values for external pressure and rate of deformation were compared with those for crystalline low-molecular substances. Variations were attributed to different glass point temperatures. Higher pressure tests (5000-6000 MPa) were also conducted, and deformations under such conditions were related to plastic flow-through movements of small segments of macromolecules. That contrasts to the situation with low pressure, where flow occurs as a result of displacement of large fragments. Figures 6; references 18: 14 Russian, 4 Western.
[6-121313]

UDC 678.5.073-405.001.5

STATUS AND PROSPECTS OF DEVELOPING WORK IN CREATING THERMOPLASTICS

Moscow PLASTICHESKIYE MASSY in Russian No 9, Sep 82 pp 6-8

LARIONOV, A. I., FEDOROV, A. A., MALININ, L. N. and POKROVSKIY, L. I.

[Abstract] Thermoplastic foams offer lightweight sound and heat insulation and other advantages in furniture and construction applications. The authors review developments in foaming during extrusion, pressure pouring, pressing and rotation forming processes for polyethylene foams, summarizing advantages and shortcomings of these methods. Use of open-pore polyethylene for fuel filtration and sound muffling in construction equipment, employment of PVC foams in numerous products from carpet padding to sealing of aerosol tanks and construction, and combinations of PVC and butadienenitrile rubber are reviewed. Dielectrics and cable production are other fields in which polyfoams are being developed and used. Communications applications are found for extruded tubing from PVC foam, and polyethylene foam is being made into toys, bottles and jars. In recent years thermoplastic foams have been poured with expanded cores and monolithic polymer skins. Pressure pouring of thermoplastic foams is used to make furniture and parts for furniture. The numerous polymers used in these processes and products include high- and low-pressure polyethylene, polypropylene, PVC, polystyrene and its copolymers and cellulose ester etrols. The most recent process developments involve "sandwich" articles made by coextrusion and coinjection. References 2 (Russian).
[11-12131]

UDC 678.632'32'21-405.8

PHENOLFORMALDEHYDE PLASTIC FOAMS

Moscow PLASTICHESKIYE MASSY in Russian No 9, Sep 82 pp 9-10

VALGIN, V. D., RUCHKIN, V. M., and KREST'YANINOV, V. V.

[Abstract] Recent advances in technology of the title foams (PFP) offer improved quality and reduced production costs. They are superior to polyisocyanurate foams in slower combustion rate and less smoke emission. Soviet applications include heat insulation. Production processes require perfection, since, for example, continuous production makes an unevenly durable product. The authors discuss use of "Vilares-400" as the sole foam plastic of this type, which would yield annual savings of more than 30 million rubles. Technology for producing PFP developed at the All-Union Scientific Research Institue for Synthetic Resins involves a simple processing of liquid resol resin, an oligomer acid catalyst, a surface-active agent and a foaming agent, and in some cases an antipyrene. A highly successful acid catalyst has been a phenolaldehyde condensation containing sulfonic groups in the aromatic nucleus. The highest mechanical durability has come with use of freon 113, petroleum ether and n. pentane. Factors affecting the mechanical durability are summarized. Open-cell PFP has been developed, but lacks sufficient buoyancy for many uses. Considering all parameters, phenolformaldehyde plastic foams are among the most promising for construction and other applications. References 4: 1 Russian, 3 Western.
[11-12131]

UDC 678.744.5:678.675:536.495:539.4

THERMALLY STABLE AND HIGHLY DURABLE MATERIALS BASED ON AROMATIC POLYESTERS AND POLYAMIDES

Moscow PLASTICHESKIYE MASSY in Russian No 9, Sep 82 pp 15-17

SOKOLOV, L. B., SAVINOV, V. M., GERASIMOV, V. D., NAUMOV, V. S. and FEDOTOV, Yu. A.

[Abstract] The title products, which have increased rigidity over aliphatic analogs, differ in that the polyesters have low-polarity components and little intermolecular reaction, while the opposites are true for the polyamides. These factors govern their applications. The authors discuss their synthesis and their reactions with other substances, such as dichloroanhydrides of carboxylic acids. Polyamides and polyarylates are obtained by emulsion polycondensation; the former with rigid para-structures are produced by polycondensation in complex homogeneous media of many components. Such synthesis is summarized. The basic polyarylate product, called DV-105, has thermal stability at 210° C and other superior durability factors. The basic polyamide

product is Fenylon S2, which contains specific fragments giving it resistance to crystallization, heat resistance at 280° C and high durability. Along with rigidity and hardness it has high blow resistance and distortion durability. Fiberglass filaments increase its durability and rigidity by a factor of 1.5-2. Graphite filaments are also being used for extremely strong products based on this polymer. The title products have excellent dielectric properties and can be bonded in various ways. They can be cast or poured into many shapes for numerous purposes in electronics, radio technology and other branches of industry. References 4 (Russian).
[11-12131]

UDC 678.042.028.6

REDUCING ENERGY INPUT IN SOLVENT REGENERATION PROCESSES

Moscow PLASTICHESKIYE MASSY in Russian No 9, Sep 82 pp 25-26

BOGOSLOVSKIY, V. Ye., KRASIL'NIKOV, A. N., MIKHALYUK, G. I., PAVLOVA, V. F. and RUFEL', Kh. A.

[Abstract] A feature of used solutions from polymer production is the presence of non-volatile components, soluble low-molecular fractions of polymers and residues of mineral catalysts, salts and the like. New regeneration processes call for distillation and mechanical purification. The authors present research into use of binary extractants of organic acids that can replace monoextractants. They have increased selectivity, distribution coefficients and capacity. A three-stage separating device is diagrammed and its operation summarized. Since regeneration of solvents is the final link in the technical cycle of polymer production, a comprehensive solution to this problem can bring considerable energy and cost savings. Figure 1; references 3 (Russian).
[11-12131]

UDC 678.664-405.004

NEW PLASTIC FOAMS BASED ON POLYURETHANES

Moscow PLASTICHESKIYE MASSY in Russian No 9, Sep 82 pp 31-34

PETROV, Ye. A., GOMMEN, R. A., YESIPOV, Yu. L. and KRYUCHKOV, F. A.

[Abstract] Polyurethane foams (PUF) have a special place among plastic foams due to their versatility. The authors review new PUF forms developed by the All-Union Scientific Research Institute for Synthetic Resins in cooperation with specialists from various branches of the Soviet economy. Block elastic PUF products are currently being used chiefly by the automobile industry;

they are produced from polyurethane foam. Open-pore variants for acoustical systems and other uses have been made by a process that causes considerable pollution; new processes to eliminate that shortcoming are being developed. Hot, warm and cold dyes are used to shape formed elastic PUF products. Semirigid formed PUF products are being used in radio technology for cases and vibration and shock protection. They are also used in the automobile industry for such things as doors and other body parts. Integral elastic and semirigid PUF articles, with cellular cores and solid surfaces, are used for passenger car interiors, steering wheels and bicycle seats. Rigid plastic foams from polyurethane, which are easily fabricated and readily varied for specific purposes, also find numerous applications, particularly for insulation in refrigerators and other cooling equipment. Research into improved periodic and continuous production methods and further practical applications continues at the institute.
[11-12131]

UDC 542.85:542.87:542.952.6

PHOTOELECTROCHEMICAL SYNTHESIS OF THIN FILMS OF POLYAZOLE ON SEMICONDUCTOR SURFACES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 266, No 3, Sep 82
(manuscript received 16 Mar 81) pp 656-658

KOGAN, Ya. L., KOZEL, A. L. and KHIDEKEL', M. L., Department of Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka, Moscow Oblast'
(presented by Academician N. N. Semenov on 16 March 1981)

[Abstract] The synthesis of thin films of conducting polymers has importance for microelectronics, silverless photography and solar energy applications. The authors studied polyazole synthesis at the semiconductor-electrolyte boundary by polymerization and simultaneous application of electrical potential and illumination of the electrode surface. The three electrodes were monocrystalline silicon, titanium oxide and transparent tin oxide on polished glass. The electrolyte is tetraethylammonium boron fluoride. Results suggest that when the semiconductor is illuminated, uneven pits are formed that, affected by the electrical charge, come to the surface and react with adsorbed azole, which oxidizes to a cation radical. The latter polymerizes and contains ions of the electrolyte BF_4^-. The polymer film covers the electrode, screening it from the light source, andtthe film rapidly changes from islets to a solid coating. Figures 4; references 3 (Western).
[12-12131]

UDC 541.182:678.743.22

FORMATION OF GRANULAR MORPHOLOGY OF POLYVINYLCHLORIDE IN SUSPENSION POLYMERIZATION PROCESS

Moscow TEORETICHESKIYE OSNOVY KHIMICHESKOY TEKHNOLOGII in Russian Vol 16, No 5, Sep-Oct 82 (manuscript received 28 May 81) pp 650-654

RYBKIN, E. P., GUTKOVICH, A. D., MARININ, V. G., GRUZDEV, B. N., KAMINSKIY, V. A. and SLIN'KO, M. G., Scientific Research Physical Chemistry Institute imeni L. Ya. Karpov; Scientific Research Institute for Polymer Chemistry and Technology imeni V. A. Kargin

[Abstract] Current PVC production involves intensification of polymerization in large reactors and expanding the assortment of PVC resins to fit the needs of numerous products. Study of the title process has shown that dimension, form and internal structure of granules is determined chiefly by interphasal tension in a system of water-vinylchloride-high-molecular surface-active substance, colloidal stability and mixing conditions. The authors studied formation and mixing conditions and analyzed a mathematical model of the dependence of aggregate dimensions on mixing intensity and emulsion concentration. Early in the process, a liquid vinylchloride formed progressively into a polymer layer. As two surfaces covered with macromolecules come together a resistance develops between them that results in spacial stabilization. Experimental tests with methylhydroxyp opylcellulose and polyvinyl alcohol showed that granule diameters increased as concentrations of these compounds were decreased. Internal porosity was of two types, the first with radii of 0.01 mcm and the second with 1-10 mcm radii. Theoretical and experimental data were in agreement. Figures 3; references 15: 9 Russian, 6 Western. [20-12131]

UDC 678.674

SYNTHESIS OF BROMINATED OLIGOESTERS AND THEIR USE IN PREPARATION OF COMBUSTION-RESISTANT POLYURETHANE FOAMS

Ivanovo IZVESTIYA VISSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 25, No 8, Aug 82 (manuscript received 1 Sep 80) pp 988-990

MASLOSH, V. Z., BUSHUYEVA, N. K., SOKOLOVA, S. M. and POPOV, A. F., Department of Technology of High-Molecular Compounds and Physical Chemistry, Rubezhnoye Branch of the Voroshilovgrad Mechanical Institute

[Abstract] The title synthesis can be accomplished by high-temperature condensation of the four-component system adipic acid + trimethylal propane + diethylene glycol + glycidyl esters of pentabromophenol (GEPBP). The latter compound provides the fire-proof properties. Four resins were prepared in this manner with GEPBP concentrations ranging from 4.39 to 15.6 wt. %. The

material will not continue burning after the flame source has been removed. The physico-mechanical properties of this resin are comparable to other materials not having the advantage of being fire-proof. Figure 1; references 7: 2 Russian, 5 Western (including 4 patents).
[28-12027]

UDC 678.652.41.21.028

STRENGTHENING SYSTEMS FOR CARBAMIDE OLIGOMERS CONTAINING TRIAZINONE RINGS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 25, No 8, Aug 82 (manuscript received 23 Nov 81) pp 1000-1003

BALABANOVA, Ye. M., KERBER, M. L. and SMIRNOVA, L. N., Moscow Chemical Technological Institute imeni D. I. Mendeleyev

[Abstract] Although new types of urea-formaldehyde resins (UFRs) containing triazinone rings show improved stability during curing, higher compatibility with water and decreased brittleness, it is difficult to obtain the optimum degree of polymerization of the UFRs. Ten different types of acid catalysts were evaluated as hardening agents, including $FeCl_3$, $NH_4Fe(SO_4)_2$, $(NH_4)_2S_2O_8$ and SiO_2 powder and various combinations. Based on a relative hardness K=1 for material polymerized in the presence of NH_4Cl, the best agent is 50%($FeCl_3$+SiO_2) + NH_4Cl (K=1.58) and the least active $(NH_4)_2S_2O_8$ (K=0.38). UFRs containing triazinone rings keep a fairly high residual stress, about 1.7 times as high as the non-cyclic UFRs. The hardener does not materially change the residual stress. For cellulosic UFRs, the optimum hardening agent is based on sulfo-acids. Figure 1; references 3 (Russian).
[28-12027]

UDC 541.64:539.3

EFFECT OF PRESSURE OF GASEOUS MEDIA ON RELAXATIONAL PROPERTIES OF ELASTOMERS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 9, Sep 82 (manuscript received 29 May 81) pp 1931-1934

STOGOVA, Ye. P. and BARTENEV, G. M., Scientific Research Institute of the Resin Industry; Institute of Physical Chemistry, USSR Academy of Sciences

[Abstract] Relaxational processes in polymers that are related to heat movements of structural elements are divided into slow and fast stages of relaxation, each having distinct features. There are no data on the title effect, so the authors studied it directly with a tension relaxation method, the test substance being a bonded butadiene-methylstyrene elastomer. Sulfur was used as vulcanizing agent at 150° C for 40 minutes. Processing of data showed the relaxational module to contain 3 lambda-processes and a beta-process at 0.1 MPa. Increased air pressure slowed gradual physical relaxation and lengthened the period of lambda-processes. Meanwhile chemical relaxation was speeded. Data on the impact of air pressure are also explained on the basis of free volume. Figures 4; references 9 (Russian). [6-12131]

UDC 541.64:539.2

STRUCTURAL PROCESSES IN HETEROGENIZATION OF RUBBER-OLIGOMER COMPOSITIONS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 9, Sep 82 (manuscript received 29 May 81) pp 1935-1940

REBROV, A. V., OVCHINNIKOV, Yu. K., KUZ'MINSKIY, A. S. and BAKEYEV, N. F., Scientific Research Physicochemical Institute imeni L. Ya. Karpov

[Abstract] The authors had previously studied heterogeneity in SKN-26 rubber-TMGP oligoesteracrylate (this journal 1977 p 684); in the present study, they sought to establish features of heterogenization in systems with varying compatability using mixtures of tetramethacrylate-(bis-glycerine)-phthalate with rubber at temperatures of 293-303 K, either rolled or from

solution. Both industrial and laboratory samples were tested. Vulcanization temperature was found to have an important effect on dispersion. The composition with SKN-26 rubber was a single-phase solution of a polar oligomer with a polar rubber at both room temperature and vulcanization temperature. Radiation-chemically initiated vulcanization using two methods showed that high temperature was only one of the factors that enhanced compatability. The process of forming dispersed microphases takes place most fully when a low rate of vulcanization is combined with rather high diffusion mobility of oligomer molecules. Figures 5; references 8: 7 Russian, 1 English. [6-12131]

UDC 678.06:661.183.123.3

RADIATION RESISTANCE OF ANION EXCHANGE RESINS BASED ON EPICHLOROHYDRINE WITH VINYLPYRIDINES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 8, Aug 82 (manuscript received 24 Sep 80) pp 1862-1864

ZAYNUTDINOV, S. S., DZHALILOV, A. T. and ASKAROV, M. A., Tashkent Polytechnical Institute

[Abstract] Rapid developments in atomic technology and hydrometallurgy of rare and radioactive metals has called for creation and application of ion exchange materials that will withstand high radiation and heat. The authors studied the title resins in OH^- and Cl^- forms. Specimens were irradiated with cobalt-60 at 500 rad/s and a temperature of 25° C. Volume losses were measured on the basis of titration of the resins. The OH^- form of the anionites had the highest resistance when the tests were made in water, while the Cl^- form was superior in dry air. Both showed resistance superior to that of the currently employed anionite (AN-31). References 8 (Russian). [5-12131]

UDC 678.664.074

URETHANE-CONTAINING GLYCOLS IN SYNTHESIS OF POLYURETHANE ISOCYANURATES

Moscow KAUCHUK I REZINA in Russian No 9, Sep 82
(manuscript received 3 Jul 81) pp 5-6

RAPPOPORT, L. Ya., TROSTYANSKAYA, I. I., PANOVA, I. P. and PETROV, G. N.,
All-Union Scientific Research Institute for Synthetic Rubber
imeni Academician S. V. Lebedev

[Abstract] Synthesis of elastic polyurethane isocyanurates by trimerization offers numerous advantages over traditional methods of producing urethane elastomers, particularly when the cross-linking and lengthening agents are trioles or diamines. The authors studied the title production method using polyesters based on adipic acid and ethyleneglycol, toluylene-2,4-diisocyanate and urethane-containing glycol based on ethyelenecarbonate and xylylenediamine. For comparison, urethaneurea elastomers were also produced. The elastomers produced were equivalent to polyurethanes but less promising than polyurethane-urea analogs. The effects of urethane-containing glycols on synthesis of segmented variants was also studied. Use of the segmentation principle for producing urethane elastomers, structured by trimerization and containing isocyanurate rings in rigid segments along with urethane and aromatic links, was shown to produce materials with superior thermal stability and physico-mechanical properties. Figures 2; references 9: 5 Russian, 4 Western.
[16-12131]

UDC 678.664.074

INTRAMOLECULAR RING FORMATION AND STRUCTURE OF DIEPOXYCARBAMATE

Moscow KAUCHUK I REZINA in Russian No 9, Sep 82
(manuscript received 23 Sep 81) pp 7-9

ITSKOVICH, I. V., RAPPOPORT, L. Ya., KORENNAYA, A. B. and PETROV, G. N.,
All-Union Scientific Research Institue for Synthetic Rubber
imeni Academician S. V. Lebedev

[Abstract] Synthesis of epoxy derivatives from isocyanate-containing compounds and glycidol has received much attention recently. These derivatives contain

end fragments of urethaneepoxide with various reactive behavior; one specific reaction is intramolecular ring formation. The authors studied features of intramolecular ring formation to find the actual structures of epoxycarbamate oligomers and possible accompanying reactions. They obtained 2,3-epoxypropyl(5-octadecylhydroxycarbonylamino-2-methylphenylcarbamate) (ODEC) from octadecanol and toluylene-2,4-diisocyanate, then converted it in an o-xylol solution at 100-140° C. Periodically, test samples were evaluated for epoxide and hydroxyl groups, molecular weight and infrared spectra. Simultaneous disappearance of epoxide and urethane groups with steady molecular weight and formation of hydroxyl groups and oxazolidone rings suggested the type of ring formation encountered. The pattern of three-dimensional linking of bifunctional epoxycarbamate includes intramolecular ring formation and formation of the hydroxyl of the oxazolidone ring, increase of molecular weight through the reaction of those hydroxyl groups with epoxy groups, forming new hydroxyl groups, and formation of first branched, and then linked, structures of side chains. Figures 4; references 11: 9 Russian, 2 Western.
[16-12131]

UDC 678.032.8.063-9:678.842.002.612

EFFECT OF CERTAIN SILICONORGANIC COMPOUNDS ON PROPERTIES OF RESINS BASED ON ETHYLENE-PROPYLENE RUBBER

Moscow KAUCHUK I REZINA in Russian No 9, Sep 82
(manuscript received 29 Jun 81) pp 15-17

BAYKOV, V. A., GRIGOR'YAN, A. G., LEVIT, R. G. and SHERSHNEV, V. A.,
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[Abstract] Polymers with siliconorganic links have recently enjoyed considerable use as modifiers of elastomers and in other rubber modification. Many major US producers use them in the organosilane form to improve durability and adhesion. The authors studied the effects of chemical structure and mix proportions of the title compounds on vulcanization. Resin mixes were prepared at 40-60° C on laboratory rolling equipment and at 60-80° C for mixing methods. Effects of increasing the content of modifying additives in unsaturated resin mixes, where more bonded rubber appeared during vulcanization, and the relation of the type of substituent on the silicon atom, are discussed. The most effective silicon-organic compounds were those containing vinyl and alkoxy groups and mercaptopropyltrimethoxysilane. In peroxide vulcanization, compounds with vinylalkoxy groups were the most effective. In saturated resin mixes, where silicon-containing additives were best added before adding plastifiers, the most effective variants were those with mercapto- or vinyl groups. Test vulcanized rubber of ethylene-propylene copolymers had more thermal durability and stable electroinsulation properties in high humidity and temperatures (70° C). Figures 2; references 7: 1 Russian, 6 Western.
[16-12131]

UDC 678-19.046.2(04)

EFFECT OF TECHNICAL CARBON DISTRIBUTION IN MIX BASED ON COMBINATION OF 'SKN-40M' + 'SKEPT' ON PROPERTIES OF VULCANIZED RUBBERS

Moscow KAUCHUK I REZINA in Russian No 9, Sep 82
(manuscript received 3 Aug 81) pp 21-23

PLEKHANOVA, A. L., CHEKANOVA, A. A., ZAKHAROV, N. D. and POLYAK, M. A., "YaPI" [expansion uncertain; Yaroslavl Polytechnical Institute?]

[Abstract] Resins with polymers of varying saturation, such as butadienenitrile and ethylenedienepropylyene, have superior ozone resistance, but their low stability precludes industrial use. To measure possibilities of improved distribution of technical carbon between the polymers in such a mixture, the authors subjected the title rubbers to, respectively, acetone and cyclohexane, with various additives such as stearine, zinc oxide, sulfur, sulfenamide and technical carbon. As anticipated, the carbon was unevenly distributed. Specific technical carbons gave varying tension under controlled stretching, with the best flexibility in those resins containing "DG-100" and "PM-100." High fatigue resistance under fluctuating bending at high temperatures was also noted for resins with DG-100. References 5: 3 Russian, 1 Western, 1 Russian translation from English.
[16-12131]

UDC 615.9

BIOLOGICAL PROPERTIES OF PETROLEUM OILS MV-20271 AND MV-2-354

Moscow KAUCHUK I REZINA in Russian No 9, Sep 82
(manuscript received 12 Jan 82) pp 42-43

SHUMSKAYA, N. I., ZHILENKO, V. N. and BEREZHNOVA, L. I., Scientific Research Institute for Resin and Latex Products

[Abstract] The paraffin-naphthene title oils are intended for use as plastifiers in food industry and medicinal rubbers, to replace vaseline. The authors studied their acute and chronic toxicity at various dosage on laboratory rats, chronic tests being checked 1, 3, 5, and 8 months after administration of the doses. Blastomogenic effects on white mice were studied at doses of 10 and 100 mg/kg for 4 months. Results of the chronic tests showed the maximum (100 mg/kg) dose caused nervous system retardation, phase destruction of hippuric acid synthesis in the liver, and various kidney abnormalities. The internal organs were affected by MV-2-271, but not by MV-2-354. Neither caused acute tumor pathology, and applications to the skin had no effect. MV-2-354 is recommended for use in rubbers for the food industry and medical purposes.
[16-12131]

UDC 541.6:547.556.3:678.074

STRUCTURE OF AZO-COMPOUNDS AND EFFECTIVENESS OF THEIR LIGHT-SCREENING ACTION IN ELASTOMERS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 9, Sep 82 (manuscript received 13 Nov 81) pp 2019-2023

IVANOV, V. B., YEFREMKIN, A. F., ARINICH, L. V., GORELIK, M. V. and SHLYAPINTOKH, V. Ya., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] Polydiene-based elastomers are very sensitive to ultraviolet rays, and the customary light stabilizers, such as derivatives of benzotriazole and benzophenone, are only partially effective and at times, worthless. The authors studied the light-protection effectiveness of organic dyes such as azo-dyes and certain model compounds on isoprene-styrene thermoelastomer with 28% bound styrene. Results showed that much lesser quantities of the tested azo-dyes provided greater protection than offered by the well-known stabilizers. Effective stabilizers contained amino- or hydroxy-groups in p-position to the azo-group; introduction of a methyl-group in o-position to the hydroxy-group increased light-protective effectiveness. Compounds with a hydroxy-group in o-position to the azo-group were no better than previously used stabilizers. The stabilizing action was strengthened by adding an electron-donor group at the p'-position. Study of the kinetics of consumption failed to establish a simple correlation between the light-screening action of the substances and their light-resistance. The azo-compounds acted simultaneously as inhibitors and as absorbers of light, thus pointing to the synergism in diffusion between the ultraviolet-light absorber and the antioxidant. Figures 2; references 4: 3 Russian, 1 English. [21-12131]

UDC 628.543:[661.7:547.553.2'211'126.82]

EXPERIMENTAL INDUSTRIAL TESTING OF PROCESS FOR PURIFYING EFFLUENT WATER FROM CHLOROBENZENE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 8, Aug 82 pp 504-505

AVDONIN, Yu. A., KORNEVA, L. V. and REKSHINSKIY, Ya. Yu.

[Abstract] An experimental industrial apparatus for removing chlorobenzene from waste water is described. The apparatus includes a pump, gross prefiltration, purification with a lamellar polyurethane membrane device and provision for recycling the fractions obtained until the desired level, in this case 0.02 mg/l, is achieved. It was demonstrated that the membrane can concentrate chlorobenzene, increasing its concentration from 60-300 mg/l to 1700-17000 mg/l. In the filtrate, the chlorobenzene content was 2-8 times less than that of the initial water, corresponding to 50-77% membrane selectivity. This selectivity is less than the 100% achievable in the laboratory, due to development of a polarization layer. Water containing less than 100 mg/l could be purified in two cycles; a higher level required three or four. The membrane lasted more than 500 hours. The results indicate that apparatus of this type is suitable for effluent water purification. Figure 1; references 2 (Russian).
[340-12126]

UDC 628.337:628.387

ELECTROCHEMICAL PURIFICATION OF EFFLUENT WATER FROM PRODUCTION OF PYROCATECHOL

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 9, Sep 82 (manuscript received 30 Jan 81) pp 2142-2145

ENDYUS'KIN, P. N., SELEZENKIN, S. V., DYUMAYEV, K. M., SHLOMA, E. N. and TIMOFEYEVA, T. S., Scientific Research Institute of Organic Intermediates and Dyes

[Abstract] The title water contains about 54 m^3/T of contaminants, including o-chlorophenol, phenol, butyl alcohol, resin, NaCl and Cu. Electrolysis on a

laboratory scale (200 ml) using a current of 1500 A/m^2 for 40 to 90 minutes reduces the chemical oxygen demand by 70 to 90%. The effects of such parameters as temperature, time, initial pH and others on the efficiency of purification are evaluated. In general, purification was more efficient at longer times, higher temperatures and more basic pH values. The changes in concentration of the individual impurities are shown for several combinations of parameters. The organic compounds are oxidized to CO_2. At 90°C and a pH of 5 to 8, virtually all of the color and phenol has been removed and the chemical oxygen demand reduced by about 90%. References 2 (Russian).
[29-12027]

UDC 541.183

ADSORPTION AND BIOLOGICAL OXIDATION OF n-HEXANOL IN AQUEOUS SOLUTIONS BY SIMULTANEOUS INTRODUCTION OF ACTIVE CHARCOAL AND MICROORGANISMS INTO SOLUTION

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 4, No 5, Sep-Oct 82 (manuscript received 25 Jan 81) pp 418-420

KOGANOVSKIY, A. M., KIRICHENKO, V. A., UDOD, V. M. and BOYKO, T. Yan-V., Institute of Colloid Chemistry and Water Chemistry imeni A. V. Dumanskiy, UkSSR Academy of Sciences, Kiev

[Abstract] An analysis of water purification was performed for the situation in which the organic impurity could be subjected to oxidative biodestruction followed by adsorption on active charcoal. n-Hexanol was selected as the experimental impurity and Pseudomonas fluorescens 5/7 microorganism was used in biodegradation. It was shown that the adsorption and biooxidation processes occured independently of each other. No synergistic effect was noted. Figures 4; references 4 (Western).
[50-7813]

UDC 628.162.84

EFFECT OF SOME FACTORS ON FORMATION OF CHLOROFORM IN DRINKING WATER

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 4, No 5, Sep-Oct 82 (manuscript received 18 Jan 82) pp 428-430

KHROMCHENKO, Ya. L., RUDNITSKIY, V. A. and RUDENKO, B. A., Scientific Research Institute of Communal Water Supply and Water Purification AKKh [abbreviation unknown] imeni K. D. Pamfilov, Moscow

[Abstract] The effect of the following factors was studied on the formation of chloroform when raw water is being processed into drinking water: total dosage of chlorine used to disinfect the water, pH of the starting ground

water and the indices of permanganate oxidizability and color of the water. Mathematical models were used for regression analysis of independent variables. Stepwise transformation showed that only pH of the ground water had a significant effect on the formation of chloroform. Figure 1; references 8: 1 Russian, 7 Western.
[50-7813]

UDC 541.18.047.6:622.793.5

ELECTROCHEMICAL PURIFICATION OF INDUSTRIAL SEWAGE CONTAINING COMPLEX COPPER CYANIDES AND THIOCYANATES

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 4, No 5, Sep-Oct 82 (manuscript received 5 Nov 81) pp 462-464

TYRINA, L. M. and MOROZOV, A. F., Institute of Chemistry, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok

[Abstract] Laboratory experiments were carried out on electrochemical purification of recycled industrial sewage from complex copper cyanides and thiocyanates. Optimal purification was obtained using a stainless steel anode, $i = 2.5$ A/m^2, $t = 100$ min and electric energy consumption of 0.18 kVt/m^3. Under these conditions the degree of purification from metallic copper, copper cyanide and copper thiocyanate was 94, 99 and 85% respectively. Figures 2; references 6: 5 Russian, 1 Western.
[50-7813]

CHROMATOGRAPHIC METHODS DESCRIBED IN NEW BOOK

Moscow KHROMATOGRAFIYA V NAUKE I TEKHNIKE (NOVOYE V ZHIZNI, NAUKE,TEKHNIKE: SERIYA "KHIMIYA") in Russian No 9, Sep 82 (signed to press 27 Aug 82) pp 2-4, 64

[Annotation, foreword and table of contents from book "Chromatography in Science and Technology (Advances in Life, Science, Technology: Series 'Chemistry')," by Doctor of Chemical Sciences Karl Ivanovich Sakodynskiy (graduate of the Moscow Institute of Chemical Technology imeni D. I. Mendeleyev; scientific works devoted to the theory and practice of molecular chromatography and to development of polymer sorbents; author of seven books) and Candidate of Chemical Sciences Boris Ivanovich Orekhov (graduate of the chemical faculty, Moscow State University; scientific works devoted to different aspects of the use of physicochemical analysis methods, including chromatography, in chemistry and in biomedical research; author of two works in popular science), reviewed by Doctor of Chemical Sciences V. G. Berezkin, Izdatel'stvo "Znaniye", 28,430 copies, 64 pages]

[Text] This booklet describes new chromatographic and electrophoretic methods of separating, purifying, isolating, analyzing and studying chemical substances used in scientific research, technology and medicine.

It is intended for a broad range of readers interested in chromatography and electrophoresis.

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Foreword

The entire world of living and nonliving nature surrounding us is built out of complex mixtures of various chemical compounds, both simple and very complex, constantly interacting with one another and forming structures of even greater complexity--crystals, colloidal particles, macromolecules, supramolecular complexes, organelles, cells and viruses. Although scientists were able to isolate and study the properties of most chemical elements and a sizeable quantity of simple and complex substances in centuries past, the world of many chemical substances and biological structures was nonetheless a mystery at the beginning of our century. In order to wrest from nature its secrets, to learn what different objects of the material world consist of and what chemical substances we ourselves are made of, we first had to learn how to isolate pure chemical substances from multi-ingredient natural and synthetic mixtures. We needed faster and more universal methods of separating the most diverse mixtures of chemical compounds into individual components. These new separation and purification methods came into being in the 20th century, which has been characterized by swift development of numerous sciences that are mutually enriching one another: chemistry, physics, biology, mathematics and so on.

Armed with the most powerful and diverse methods of separating and analyzing chemical substances, modern science has revealed many secrets about the composition of complex natural mixtures such as, for example, petroleum or human blood; it has established the nature of many low and high molecular weight components of the cell; it has revealed what organic compounds are contained in sedimentary rock that has preserved the remains of Precambrian microorganisms; it has demonstrated the abiogenic origin of organic substances discovered in meteorites and samples of lunar soil. Within the powerful arsenal of chemical and physicochemical methods of separation, analysis and study of the structures and properties of individual chemical compounds and their complex mixtures, chromatography occupies one of the leading places.

Arisal of chromatography as a scientific method is quite validly associated with the name of an outstanding Russian Scientist, Mikhail Semenovich Tsvet (1872-1919), who discovered chromatography in 1903 in the course of his research on the mechanism behind transformation of solar energy into plant pigments. Tsvet created the foundation of discrete separation of complex mixtures, brought together different variants of chromatography beneath the umbrella of a single theory and achieved separation of mixtures of plant pigments.

Chromatography has now attained a significant level of development, including in terms of the use of hybrid methods entailing, in particular, dynamic migration coupled with simultaneous application of an electric field (electrochromatography, or electrophoresis), specific biological interactions (affinitive chromatography) and so on. Today the diverse methods of chromatography, especially when combined with other physical and physicochemical methods, help scientists and engineers to solve the most diverse, often very complex problems in scientific research and in technology.

It is impossible to even briefly examine all of the presently known methods of chromatography in a small booklet. Therefore, considering recent publication

of the popular scientific booklets "Khromatografiya" [Chromatography] by K. V. Chmutov and "Tsvetopis'" [Color Writing] by M. S. Vigdergauz by Izdatel'stvo "Khimiya" and the articles published earlier in the journal KHIMIYA I ZHIZN' on paper, thin-film and gas chromatography, attention will be focused on the relatively new variants of chomatography and electrophoresis. This booklet will briefly describe the fundamental principles and the different areas of application of the described chromatographic and electrophoretic research methods.

11004
CSO: 1841/26

UDC 621.892:66.094.38:541.14

INHIBITION OF PHOTOCHEMICAL OXIDATION OF PROTECTIVE LUBRICANTS

Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 106, No 1, Apr 82 (manuscript received 5 Jun 81) pp 65-68

MELIKADZE, L. D., academician, GSSR Academy of Sciences, EDILASHVILI, I. L., IOSELIANI, K. B., BARABADZE, Sh. Sh., SHATAKISHVILI, T. N. and SVANIDZE, O. P., Institute of Physical and Organic Chemistry imeni P. G. Melikishvili, GSSR Academy of Sciences

[Abstract] For shielding metal objects stored in the open, protective hydrocarbon coatings are widely employed. Atmospheric oxygen, ultraviolet light, temperature and humidity will break down such coatings and these factors are even more corrosive in tropical and sub-tropical regions. The authors studied metallic salts and several derivatives of phosphoric (DTP) and carbaminic acids (DTK) as antioxidants for hydrocarbon and petroleum coatings used on industrial devices, cylinders and transformers. Results showed that the additive of a phosphoric acid derivative with nickel at 0.5% of mass provided the best reduction of lubricant deterioration. The variant with carbaminic acid and nickel was also found to be effective in protecting against radiation of the sun. Figures 2; references 9: 8 Russian, 1 English.
[9-12131]

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